Smart Move:
Five Steps to a Successful Data Center Relocation

As organizations relocate their data centers, many lack the up-front planning that reduces the short-term risk of business disruption and the longer-term risk of choosing a facility poorly suited to their ongoing business needs.

INTRODUCTION

Across the U.S., data centers are literally in motion. Many companies, from manufacturers to retailers, from health care to high tech, are relocating their computer facilities in search of more efficient, effective and secure IT operations.

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Today, data center operations represent about one-quarter of most company's total IT costs, so managing relocation has taken on increased importance. Directing a complex data center migration is anything but easy. When done right, a move requires careful planning and expert execution. But, if poorly managed, a move can disrupt business operations for days, or weeks, once the new site goes live. Longer term, moving to a bad location—one with insufficient power, suboptimal space, or an inflexible landlord—can force a company to move its data center again.

Data center relocations require excellence in planning and execution. Common mistakes such as failure to properly evaluate the " build versus lease " decision, or relying too much on an overburdened IT staff, can be prevented. In this white paper, we discuss typical relocation pitfalls to avoid as well as site selection, facility design, and relocation techniques that can make a data center move a success.

WHY DATA CENTERS MOVE

Today, more and more companies are planning to relocate their data centers. In fact, according to a Gartner Group study, more than 70% of the Global 1000 organizations will have to either move or modify their data center facilities significantly during the next five years. There are many scenarios that justify a data center relocation, the most common being the need to update aging infrastructure. The average age of today's data centers is 12 years, which frequently leads to the following business and technical problems:

OUT OF POWER. The facility lacks sufficient additional power required for upgrades to high-density server and storage systems. If 200 watts per square foot is required and only 100 watts is available, the only options are to retrofit the space, use different systems or move the data center.

OUT OF COOLING. In older facilities a point of diminishing returns can be reached where the cost of additional cooling increases at an accelerated rate. In this case, the only options are to retrofit the space (assuming sufficient power and airflow are available), consolidate systems or move.

OUT OF SPACE. With the need for more power and cooling demanded by state-of-the-art equipment, operating a data center in traditional office space is becoming increasingly difficult and expensive. In some cases, the migration to high density systems is blocked simply on limitations in ceiling height and the inability to introduce sufficient cool air while adequately handling the heated exhaust.

LEASE RENEWALS. With increased demands for power, cooling and space, a leased facility may be reaching the end of its useful life. The facility owner may be unwilling, or economically unable, upgrade the facility to meet "state of the art" requirements for high density data centers.

The reasons why companies may choose to relocate their data centers are clear and compelling. However, since a data center move is often a "once in a career" event, many companies experience these same avoidable and costly mistakes.

TOP 3 REASONS DATA CENTER RELOCATIONS FALL SHORT

Problem Area	Signs of Trouble
"Squeeze It In"	Companies often underestimate the complexity of a data center move and try to accomplish a relocation with current oversubscribed staff. • Limited practical experience in moving operations (few companies consider this as a "check box" item in employee screening/hiring) • May have limited understanding of application dependencies in a heterogeneous IT environment, especially for legacy systems • Lack expertise in emerging data center design infrastructure including high density provisioning and high efficiency operations (Green IT)
Operate in Silos	With the emergence of high density computing, high efficiency facilities and complex, enterprise wide application systems, companies must work collaboratively across departmental silos to assure business objectives are met. • IT may inflate their power and cooling requests above actual need to assure "buffer for the unknown" without realizing the impact on space design, layout and infrastructure costs (more expensive infrastructure: generators/back up, cooling, etc.) • Conversely, facilities may not fully understand the impact high density systems will have as they approach points of rapidly diminishing returns and escalating costs related to power and cooling physics • From a business perspective, there may be service level agreements in place with a company's customers requiring advance notice of planned outages. Any Such business obligations require careful consideration by technical IT and facilities management working together
Vendor Reliance	Organizations turn to outside software and hardware vendors, vendor commissioned on product sales, for "free advice" to accelerate their learning curve and avoid common mistakes. • Most vendors', sales reps, and professional services staff are trained to believe that data center relocations are the best time to introduce new products and services. While it is important to know about emerging technologies, more "moving parts" add risk and complexity to data center relocations • Vendors seldom have experts in-house for relocations and will outsource the move to subcontractors. These subcontractors are then directed based on vendor perceptions and priorities which are often far removed from the company's strategy and business goals

HOW NOT TO MANAGE A MOVE

A number of companies have found moving data centers to be anything but easy. For example, Hostway merged with Affinity Internet to become one of the world's largest Web hosting providers with 600,000 customers and 15 operations centers in 11 countries. Three months later, Hostway planned to move 3,700 servers, for 3,000 of its customers, from its Miami center to Tampa, Fl. The company warned customers to expect outages of between 12 to 15 hours during the move.

Relocating a data center is not a simplematter of pulling out the plugs in site 'A'and plugging them back in at site 'B.'

As it turned out, those outages lasted three days (and even longer for more than 400 customers) resulting in lost revenue and profit, not to mention a serious blow to their reputation. Summarized by a Hostway vice president, "The company saw an unusually large number of hardware failures that occurred during the transportation."

"It literally sounds like Hostway took their servers, put them on a truck, unpacked them and tried to plug them in again," said one analyst[1]. Another hosting provider supporting 165,000 websites planned to relocate 200 servers to a new location. Customers were told their sites would be down for about 12 hours on a Saturday. In fact, many sites were down for days. The truth is, relocating a data center is not a simple matter of pulling out the plugs in site 'A' and plugging them back in at site 'B,' as many companies (to their distress) have discovered.

THE RIGHT WAY TO MANAGE A MOVE

Fortunately, industry "best practices" do exist and can help guide a company through any data center move. The following steps summarize the most important areas on which to focus when planning a relocation.

STEP ONE: Build or Lease?

The first decision facing an organization that has decided to move is whether to build or lease.

When a company owns its own data center, it assumes greater maintenance costs, security expenses (such as guards), and other risks. Building a new data center from scratch requires a large capital outlay. For example, constructing a Tier 3 data center can cost as much as $10,000 to $20,000 per kW of capacity. Although building a new center gives an organization maximum flexibility and control, for most companies this option is too far removed from their core competencies to be realistically considered. Relatively few organizations have the expertise needed in real estate and construction, data center design, operations, security and maintenance.

On the other hand, leasing has its own challenges. If a company does not own its own facility, its landlord can raise the rent or make other demands. We have seen landlords give 30 days notice for renters to purchase more of its services or pay additional rental fees. In one case, rent was tripled and as a result, some tenants moved. Those unable to do so were seriously hurt by this increase in costs.

When leasing, long-term lease agreements are an absolute necessity. Relocation is simply too expensive, time consuming, and risky to be forced prematurely. This is especially true for larger companies with bigger data centers. Companies must lease with the future in mind. This means contracts should include extension provisions. It also means leases should contain expansion options for future growth and possibly purchase clauses should the landlord falter financially and be forced to sell.

Whether a company decides to build or lease, it cannot afford to trust to luck (or to any provider's unvetted expertise) that the design of the data center will fulfill its current and future needs. Whether it builds or leases, a company can (and most often should) outsource the design work if it lacks internal expertise in the design of state-of-the-art high-density data centers.

If a company is leasing a new data center, it is of course constrained in design by the available space and future expansion rights. This will make optimizing the available space even more critical. At a minimum, the company must evaluate the following key points and ask the right questions:

CAPACITY (Initial and Future)

- Is there enough power and cooling? Are the power and cooling "in balance" or will one run out before the other?
- How can I reduce or eliminate expansion risk without overpaying now?
- Is there enough physical space? When you need to grow, where will additional space be provisioned (e.g., is it adjacent to initial space and on the same power / cooling systems)?

FACILITY DESIGN VERIFICATION

- How can you verify capacity is "as advertised" for uptime design, redundancy, load, etc.?
- Are there any failure points that could cascade through the facility?

FACILITY MAINTENANCE.

- Are the systems properly maintained and are the records auditable for generators, air handlers, pumps, chillers, fluid levels, etc.?
- Is maintenance outsourced or provided by facility staff? How are they hired and trained?

If a company is building a data center, it must be involved in all the design issues from the start. These will range from facilities concerns like verifying that floor-to-ceiling height is adequate, to the more arcane (yet critical) disciplines of rack configuration.

Regardless which path is most appropriate—build or lease—the next step is to make sure the specific site will meet your short term and long term objectives.

STEP TWO: Conduct a Site Sutability Analysis

A site suitability analysis should be conducted prior to either leasing or building a new data center. There are many factors to consider when choosing a site, including:

GEOGRAPHY. The data center should be located far from high-risk sites of potential natural disaster, such as floods, earthquakes and hurricanes. Locations near major highways and aircraft flight corridors should be avoided as part of risk mitigation. The site should be on high ground, and protected.

COMMUNICATIONS. The site should have multiple, fully diverse fiber connections to network service providers.

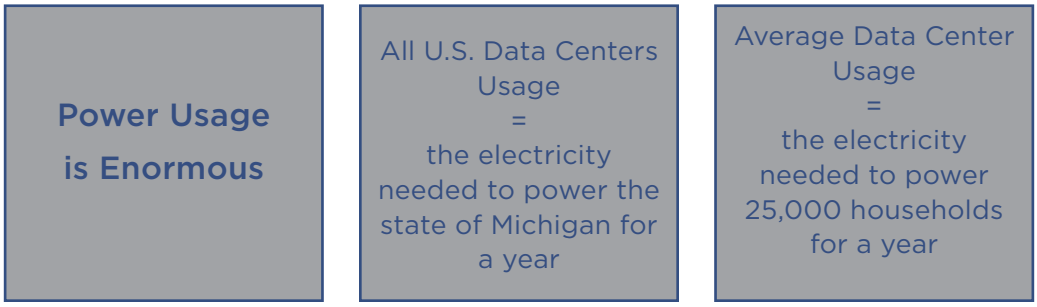
ABUNDENT POWER. In 2010 data centers consumed about 2 percent of all electricity generated in the U.S., and consumption is projected to continue its rapid growth (see chart next page, "Data Center Power Usage"). Any site under consideration should have easy access to abundant power from multiple sources of electricity, taking advantage of low cost providers whenever possible.

SPACE. Data center relocations, as noted, are expensive, and one doesn't want to do them often. Therefore, before siting a new data center, the organization must analyze its planned business growth. Don't build or lease based on your current needs -- always determine (as best you can) how much space and power you'll need five or ten years down the road.

Many other considerations related to location will also enter the picture. For example, you'll need to consider the availability of water (needed as a reliable backup supply for cooling towers and chillers); environmental approvals for fuel (including backup generators) and building exhaust; 24x7 building security; and much more.

Data Center Power Usage

Data centers account for 1.7 – 2.2% of all electricity generated in the U.S. today and are projected to rise in the future despite the impact of virutalization and cloud computing.



Sources: Analytics Press/Stanford University Report, August 2011

STEP THREE: Plan Thoroughly, and Well in Advance

A successful data center relocation project requires comprehensive planning and preparation well outside the scope of normal day-to-day IT operations. With many IT departments already stretched thin, the chances for success greatly increase when outside experts are brought in to help. While there are several ways to determine a move team's success after the fact, two of the best methods are to measure system performance and the satisfaction of end users after the move is completed. Both metrics should be verified to be "equal to or better" than they were prior to the move.

In creating a comprehensive move plan, the following steps are recommended:

Benchmark Applications. This will provide the basis for verification when the systems are returned to service. Establishing a baseline also provides a validation point / frame of reference should questions be raised "post move" regarding application performance.

Determine Maximum Allowable Down Time Acceptable for the Move. With proper planning, a move can be accomplished in a time window that is appropriate to the mission / operations: from zero downtime, to several hours or even a day or two. For example, high volume e-commerce businesses and applications where public safety is at risk may demand a "no down time" move whereas B2B operations that operate on a Monday to Friday schedule may be appropriate to move over a weekend. Some large-scale moves may make sense to accomplish in a series of move events with each "bundle" being achieved in its own appropriate move window.

Identify Server, Storage, and Application Dependencies. As enterprise applications cross departmental boundaries, it is important to define functional "move bundles" to assure that full business process support is returned to service as quickly as possible.

Review All Relevant Agreements and Contracts. The list should include vendor leases, maintenance agreements, warranties and insurance policies. Be sure to determine how requirements or restrictions may impact the move's success or introduce risk.

Identify Move Resources. What employees will be involved and what will be their role be prior to, during and following the move? What supplier and service contractors will be involved? When multiple organizations are working together, make sure the chain of command and responsibilities are clear.

Create a Completely Elaborated "Move Day" Plan. (We call ours "Runbooks"). Just as NASA wouldn't try to launch without a complete flight plan with clearly defined owners for every activity, you need a thorough, minute-by-minute, plan for your move events. To minimize the risk of making mistakes, your runbook needs to encompass everything from application shutdown to system backups to physical move activities, and you need to stick to it on the day of the move. Automated tools can greatly ease the burden, here, too.

STEP FOUR: Minimize Complexity and Change

Prior to the move day, organizations should freeze their application configurations and not introduce change and complexity. Sometimes, data center relocations are viewed as an opportunity to upgrade software, hardware, or network elements, as change seems easier to accomplish in a fluid environment. This is a bad idea for many reasons. Among other issues, changing the application portfolio at move time makes it difficult to measure the move's success because the pre-move baseline has been altered.

Any change undertaken during a move adds risk and complicates the project. This is especially significant when it comes to today's popular practice of server virtualization. Resist the urge to virtualize as part of a data center relocation. Virtualization is a significant project in itself, and attempting to virtualize servers during a move means trying to do two very difficult things at the same time—a recipe for disaster.

There is one exception to the "no changes" rule: An organization should consider the purchase of new core networking gear before the move. This will significantly reduce the risks and down-time of reinstalling network gear at the new site during the move. The network should be up and fully tested before any move is made.

STEP FIVE: Use Dedicated Resources on Move Day

As with all complex tasks, the devil is in the details. Managers undertaking a data center move must create detailed checklists covering everything from server rails to cabinets to specialized tools (e.g., screw threaders for stripped screws; sledge hammers; special power cords to prevent outages when servers cannot be reconnected, etc.). Extra manpower will accelerate the move, reduce down time and allow optimum use of individual skills.

Before moving day, you will have already developed your timeline, manpower / resource plan, interdependencies and move bundles. By this time everything should be labeled (every device, every rail, every cabinet, every cable, everything), new cabling and network connectivity should be installed and tested in the destination data center, and trucking and manpower ready and waiting.

To limit downtime, a data center move should begin as soon as applications have been shut down, and the move should be scheduled at a time when involved employees are able to fully focus on the move's success. Trying to "squeeze in" a move on top of full time, daily responsibilities is doomed to failure. It will create a heavy tax on employee morale and unnecessarily prolong the move and potentially impact the business.

For example, one software company wanted to move 225 servers to a new data center. It planned to accomplish this relocation over the course of five weekends during the summer, effectively eliminating summer weekends for its IT staff. By reworking the plan and leveraging experts in data center relocation, this company completed the move in one weekend. This saved significant time and money, while keeping core IT staff focused and motivated on day-to-day operations.

WHY EXPERIANCE MATTERS

There is a truism in the military: “No plan survives contact with the enemy.” This means that no matter how detailed the plan, the people who execute it must always be ready to make adjustments for the reality on the ground. Make sure the “move day” team knows the plan and their responsibilities. Make sure you have data center move experts on hand—this is clearly not a good time for on-the-job training.

As IT becomes ever more essential to business success, companies are outgrowing their data centers and data center relocations are moving to the center stage of IT execution. However, selecting a bad site or poor planning can result in higher expenses and another move far too soon. Worse, a botched move can stop an enterprise dead in its tracks.

Unfortunately, operational IT knowledge does not translate into an understanding of how to best move a data center. Nor does real estate knowledge translate into the ability to select the best data center site.

Businesses need data centers that can both support their current operations and provide the flexibility for future growth. As more and more companies contemplate data center relocation, they need to remember that a move is like a battle; it requires great planning, excellent execution and sufficient manpower.

ABOUT TRANSITIONAL DATA SERVICES (TDS)

TDS provides independent assessments, recommendations and improvements for IT, including data center designs, relocations, operational support, ERP, and web and mobile applications. Our recommendations cross departmental and technology silos to achieve the best ROI for our clients. Since we do not operate as a vendor, VAR, or real estate broker we are unrestricted to a specific product portfolio and unbiased by the latest trends and highest commissions.

TDS clients include successful organizations of all sizes and industries including Kayak.com, The University of Texas, Boston Red Sox, Cedars-Sinai Medical Center, Liberty Mutual and many others. As these organizations are committed to leadership in their respective fields, they rely on quality business partners like TDS to operate transparently in their best interest.