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The Leading Association for Data Center Professionals

Building Data Centers Requires Vision

By Gene Kern

While the life expectancy of a data center can be 20 years, most data centers built before 2000 are at the end of their useful life, and some argue that in today's rapidly changing environment the upgrade timetable is even shorter. There is no clear-cut benchmark for determining when a data center needs to be upgraded or replaced, and it is often difficult to know just what the timetable is. Usually, the process starts with the recognition that the business needs of the organization have already outstripped the capabilities of its data center. Symptoms may appear, such as outages on aging infrastructure or a lack of electrical, cooling or space capacity. A 2006 study conducted by the Aperture Research Institute found that 40 percent of data centers ran out of space, power or cooling capacity without sufficient notice. And given that it can take two years to get a new data center up and running, it is imperative that organizations know what their needs will be over the course of the data center's lifetime so that it is not obsolete before it is even built. Building today's data center so that it meets tomorrow's needs requires vision.

One key predictor of success for any data center build is the team of players assembled for the project. The external players that have traditionally participated in a data center build are architectural, engineering, construction management and trades firms. Increasingly, organizations have been calling on technology consulting firms to serve as a major player in the process and, as a result, find they can save hundreds of thousands of dollars by implementing highly efficient and cost-effective solutions that meet their long-term needs. What technology consultants bring to the table is the knowledge and experience necessary to help create the long-term technology vision of what the organization needs.

Technology Consultants

A strong technology consultant provides a level of oversight that is not possible with a traditional architectural or engineering firm. When selecting a technology consultant, an organization should look for the following characteristics:

- Experience
  - It is important to have someone with direct experience in data center design and the implementation of IT infrastructure with visibility up through the executive level (CIO, vice president, data center manager, etc.), including budgeting and vendor negotiation.
- Subject matter expertise
  - A strong technology consultant is someone who has demonstrated domain knowledge in all facets of IT infrastructure. This includes certification in project management, systems engineering, networking, enterprise administration and security and others. Certifications to look for include PMP, CNE, MCSE, CCEA, CompTIA, Red Hat, SUSE, CISSP and VCP VI 3.
- Best practices
  - Data centers built and operated according to accepted best practices are fundamentally more cost efficient, effective and longer lasting than those that are not. A good technology consultant will employ best practice frameworks for IT infrastructure including:
    - Information Technology Information Library
    - Control Objects for Information and Related Technology
    - Information Services Procurement Library
    - Application Services Library
    - Dynamic Systems Development Method
    - Capability Maturity Model

    Other best practices include those from manufacturers on product use, like IBM redbooks and industry standards such as those from the International Organization for Standardization, the American National Standards Institute and the Telecommunications Industry Association, which has developed the TIA/EIA-942 data center standard that establishes a guideline for the various design and construction elements of both a large and small-scale data center.

- Vendor neutrality
    - The hallmark of a good technology consultant is one that advocates for the client organization, not the vendors. It is important to select a technology consultant that is current on all the latest developments from leading vendors and is knowledgeable enough to cut through marketing hype to recommend solutions that really work.

Methodology

The most common approach to designing and building a data center is to follow the American Institute of Architects' five-phased building methodology that includes: programming, schematic design, design development, construction documentation and construction administration.

Absent from this methodology but critical to a data center's success is a visioning phase, which is a critical element in capacity planning and management and an operational management phase, which ensures a smooth transition of operations. These two areas are where the technology consultant adds critical value to the process. The following illustrates the complete process model that includes all seven phases.

Visioning

The visioning phase complements the organization's strategic plan and is led by the technology consultant. It identifies the target audiences for technology use and the stakeholders who influence the organization's technology direction. During this process, future technologies and approaches to technology use are examined and a vision of the future is developed. Large group interaction sessions are used to stimulate creative thinking among the stakeholders, especially the end-users. This idealized look into the future sets the design direction of the build, i.e., high-density, virtualization, etc. A realignment of IT strategies with business strategies often comes as a byproduct of this process. The goal is to provide a forward-thinking view of how the new space will be used.

Included in the visioning phase is the determination of whether or not to employ green technologies and how best to utilize resources to make the environment as green as possible. For example, a technology consultant may determine that a virtualized environment can increase server capacity by 100 percent without increasing the required footprint, and provide the appropriate calculations for the

heating and cooling requirements that will change as a result. A thorough analysis of the different options and the cost-benefit of each are factored into the plan prior to moving to the programming phase.

Programming

The second phase in the process is the programming phase and starts the development of the technology design programs for each space in the data center. Three outcomes of this phase are requirements, budget and standards.

During this phase, the technology consultant completes an assessment that includes a review of all documentation, interviews with key stakeholders, development of the space requirements, definition of technology standards to be used, and the development of the base budget projection. Technology standards are often defined and documented during this phase to prepare for the ensuing space design and are combined with the engineering standards to form the basis of design (BOD) document.

Schematic Design

During this phase, the architectural, engineering and technology consulting firms work together to establish the preliminary design, layout the technical requirements, review and confirm these items with the stakeholders and define and establish the project budget. This is the phase in which the first set of conceptual drawings (schematics) are produced and discussed.

Design Development

During the design phase, the schematics are reviewed and revised as space and technology needs are aligned. The design narrative, or BOD, is finalized and the budget projection is updated to reflect a clearer view of the end result. The technology consultant conducts a detailed review with the architectural and engineering firms to ensure the best value is being achieved for the organization and that all requirements are being met. This is critical because once a project moves into the construction administration phase, change requests will add as much as 40 percent to the budget.

Construction Documentation

Full drawings are created and submitted. Collected data is validated. These are reviewed with the end users and detailed design specifications are developed. This can be an intense period of negotiation, realignment and budget justification internally with all stakeholders—IT, facilities, end users and management—all trying to get the best value for the organization's limited funds while ensuring that their needs are met. From this comes the detailed budget for the project and the creation of the RFP/RFQ documents that give the bidder all the information needed to provide a competitive bid.

Construction Administration

RFPs/RFQs are released, vendors are selected and the project is awarded. The construction management firm is brought on to manage the contractors and service providers. This is the phase of the project where ground is actually broken and the trades come into play. During this phase, the architectural and engineering firms move from a design role into oversight. The technology consultant is involved as the technology project manager to ensure that technology needs are being met as documented. All parties stay engaged on a regular basis to oversee their areas of responsibility. As construction progresses, changes to the design will need to be made to accommodate the realities faced during the build. It is critical that everyone is engaged in the discussion and subsequent solution.

The construction administration phase ends with the testing and validation of engineered systems, completed proof of performance documentation, an issued certificate of occupancy, and final turnover of the as-built documentation. The new technology systems are not included in the testing cycle of this phase by the architects, engineers or construction firms. However this is a very good point at which to test network connectivity throughout the space. This is where the architects, engineering firms, construction management firm and the trades finish, except for the punch lists. However, this is not where the project ends.

Operational Management

The final phase of the project is operational management, when the computer systems are moved into the new space and operations cut over to the new system(s). The technology consultant firm is the only external player still at the table and its role is to ensure: 1) that the move into the space goes well, 2) operations procedures are revised to fit the new processes required for the new space, 3) disaster recovery

processes are changed to reflect the new space and systems, 4) maintenance schedules have been revised, and 5) operational documentation for the client's systems is made current. The final step in the process is to ensure that personnel are trained on all the new processes to avoid interruptions in service due to human error.

Aging data centers are a growing reality, with an estimated 38 percent of the world's centers at least four years old and unable to adequately support the high-density computing environments demanded of them (ARI survey, 2008). With rapidly changing technology, increasing demands on information technology, not to mention the current credit crunch and economic uncertainty in the United States, data center managers are under increased pressure to optimize the performance of mission-critical operations in the most cost-effective way. With the right technology expertise and a comprehensive plan that includes a strategic visioning phase as well as an operational management phase, an organization greatly increases its probability of building a data center that will meet its long-term needs.

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