CenturyLink® Business

TECHNICAL BRIEF

Data Center Management Best Practices: The Relentless Pursuit of Perfection

Challenge

Identifying data center providers that can consistently achieve 100% uptime.

At Stake

When your IT infrastructure is not available, neither are your business operations.

Solution

Find providers that exhibit strict adherence to documented procedures and clear cultural imperatives for communication, collaboration, and continuous improvement.

If you're not a pilot, you probably cannot imagine or appreciate the incredibly deep processes, procedures, documentation, and training required to safely fly a commercial jetliner. But if you've ever seen a cockpit you can appreciate that it's all there, embraced by a culture that obsesses over it.

It's the same with data centers, whether on-premise, colocated, or in the cloud. Certified Tier III[1] data centers use their own deep processes, procedures, documentation, and highly trained staff to stay up and running, come what may. Such facilities management practices are the critical foundation on which your entire enterprise IT infrastructure rests — which, in turn, supports all business operations.

And while data centers may not fall out of the sky when they fail, losing your IT infrastructure sure feels like the sky is falling on your business.

Consequently, IT decision makers evaluating data center providers should look for an obsessive focus on a culture that literally celebrates — and compulsively adheres to — process and procedure. And the first place IT managers will find the crucial evidence that such a culture exists is in the providers' documentation, because it is the documentation that makes data center operations and facilities management practices standardized and repeatable, and empowers continuous iterative improvement.

Documentation for all, and all for Documentation

The very best-managed data centers achieve that status because they have well-documented procedures for everything. That means operations and facilities staff have a script to follow whether they are changing a light bulb or preparing for Superstorm Sandy — and even for events they have never before encountered.

Think about it: If your data center or cloud services provider is changing a light bulb, it means someone may be climbing a ladder set up over your IT infrastructure, or infrastructure that is providing you with services. That provider better have strict light bulb policies, indeed.

At the opposite extreme, the executive brief "Superstorm-Proof Your IT Infrastructure" includes a description of CenturyLink Business' response to Superstorm Sandy in October 2012. In short, pre-emptive actions cued by documented procedures developed from previous storm experiences kept all customer environments up and running at 15 data centers in the storm's path. While most customers did move into crisis management or full disaster recovery mode, it was due to other effects — not related to CenturyLink's data centers.

Then there are the unprecedented events. It may be hard to conceive of a documented procedure for responding to the unknown. In this case, the procedure is less about a detailed fix and more about how to respond, rather than just react. It details escalation and communication expectations based on the nature and severity of the unforeseen event, and how to respond without creating "a second victim" — i.e., a new problem caused by an action taken in the course of your response.

Celebrating Process And Procedure

Of course, we're all aware of organizations with great policy manuals that nobody ever follows. That won't fly for data centers committed to 100% uptime. Instead, IT managers should look for evidence of a provider culture that embraces and strictly adheres to its documented processes. Aside from direct observation via live data center tours, such evidence emerges in the providers' emphasis on training, communication, collaboration, and continuous improvement.

Culture Of Training

The importance of a well-trained staff — including ongoing training to keep personnel at the top of their game — cannot be overstated. It is, however, best explained in a paper from the Uptime Institute:

A well-trained staff with good operational practices, procedures, and policies can exploit the potential value from any Design Topology. A site with a poorly trained staff that lacks good operating practices and maintenance programs will likely fail to reach the availability levels anticipated during the design of a data center.[2]

Because IT constantly evolves, formal training is necessary but not sufficient. For example, at CenturyLink, all documented procedures undergo peer review. Over time, the company discovered that peer review contributes to personnel training. As new procedures are developed and documented, staff participates in the review and thus maintains expertise on the systems involved.

Culture Of Communication

For a well-managed data center provider, collaboration is no "nice-to-have" feel-good thing. It's embedded in the organizational structure, a linchpin of ongoing process and documentation evolution (e.g., the peer review discussed earlier), and a key contributor to efficiency and even disaster response. The Uptime Institute even states that the separate IT and facilities teams that operate in most data centers should be so closely aligned that they become one "Integrated Critical Environments" (ICE) team.[3]

At CenturyLink, the ICE teams that manage our 60+ data centers worldwide comprise one global organization. That organization is subdivided into teams dedicated to each site and regional teams working with multiple sites, ensuring that all standards are equally applied globally. And everyone participates in two global conference calls per week, not only to discuss immediate operational issues but also to contribute to the ongoing evolution of standards and practices.

This collaborative structure and standardization, combined with the peer-reviewed document control program, enables CenturyLink personnel to easily support other facilities during periods of heightened risk, without requiring significant training for staff to become familiar with the facilities receiving the additional support.

Culture Of Constant Vigilance

For a data center provider to maintain consistent reliability and availability across a varied and changing footprint requires constant monitoring and maintenance of critical systems. This helps to avoid the avoidable problems.

This includes monitoring UPS battery conditions, and regularly maintaining or replacing them to assure power is there when needed; regularly "exercising" generators and switching gear;

"polishing" diesel fuel to maintain it in peak condition; and regular preventative maintenance on all critical systems, e.g., air filter changes, cleaning, lubrication, etc.

Culture Of Continuous Improvement

It's clear to see how all of the elements already discussed contribute to a culture of continuous improvement. But again, they are necessary but not sufficient. Two other elements are required: an environment that encourages open reporting of mistakes, and a system that tracks the results of mistakes as well as problems that emerge from no one's error at all (like hurricanes).

Open reporting of mistakes, rather than covering them up, leads directly to improvement by enabling the organization to act on that information, adjusting processes to minimize reoccurrence of the error.

So does an effective tracking system. CenturyLink's problem-tracking system is inclusive of all types of problems, including those related to internal equipment, employees, or vendors. It accomplishes many things, including:

- Ensuring follow up on items that might create problems in the future;
- Identifying similar scenarios or locations where a common problem might recur;
- Establishing a review and training process to prevent future incidents through operator education;
- Justifying necessary improvements in systems creating problems; and
- Tracking performance over time to analyze success in implementation and evaluate the need for improvement.

The demand for continuous innovation has inspired CenturyLink's multi-decade quest for the "Perfect Data Center" design model and process. We're currently on our fourth generation of the Perfect Data Center — and, of course, it certainly won't be the last.

Conclusion: The Relentless Pursuit of Perfection

Applying new technologies and honing best-practice facilities design standards is an ongoing process. But the best technology and design, alone, will not deliver the efficient, high-quality data center modern businesses demand. It takes an organization of experienced, well-trained, collaborative staff, with a commitment to rigorous adherence to standards and methods, to deliver on the promise to always be up and running, come what may — to be the "Perfect Data Center."

Data Center Management Practices To Look For

- Written, step-by-step configuration procedures for every piece of critical equipment — in normal operations, abnormal situations, and emergency situations.
- Peer-reviewed scripted procedures for all possible actions — from mundane light bulb changing to hurricane response.
- A culture that truly embraces strict adherence to those scripted procedures.
- Global standardization of documented procedures.
- Commitment to training — both formal and informal (i.e., embedded in ongoing processes, such as peer review of new processes and procedures).
- Commitment to communication, including scripted escalation procedures for internal and customer notification of impactful events.
- Commitment to collaboration, including regular organization-wide conference calls to share information and practical experience.
- Constant monitoring and maintenance of all systems to avoid the avoidable problems.
- Continuous improvement that demonstrates a relentless pursuit of "the Perfect Data Center."

About Hybrid Infrastructure Solutions from CenturyLink

CenturyLink's Hybrid Infrastructure solutions infuse agility into IT infrastructure, whether your business is challenged with controlling costs, managing performance, or scaling and expanding into new markets. CenturyLink is recognized as the No. 2 retail colocation provider, with an extensive global footprint that includes more than 60 state-of-the-art data centers across North America, Europe, and Asia, with over 2.6 million square feet of raised floor space.

About CenturyLink Business

CenturyLink Business delivers innovative managed services for global businesses on virtual, dedicated and colocation platforms. It is a global leader in cloud infrastructure and hosted IT solutions for enterprise customers. Parent company CenturyLink, Inc. is the third largest telecommunications company in the United States, and empowers CenturyLink Business with its high-quality advanced fiber optic network. Headquartered in Monroe, LA, CenturyLink is an S&P 500 company and is included among the Fortune 500 list of America's largest corporations.

For more information visit www.centurylink.com/technology.

1 "Tier III" is a designation of the Uptime Institute certifying that a data center is designed and constructed to exacting specifications such that it does not have to shut down for equipment replacement or maintenance. Further information is available in the Institute's description of tier classifications (http://uptimeinstitute.com/images/stories/press_kits/UIPS_TiersSummary_1000511.pdf) or at its site, http://www.uptimeinstitute.com.
2 Operational Sustainability and Its Impact on Data Center Uptime Performance, Investment Value, Energy Efficiency, and Resiliency, Uptime Institute. The paper can be found at http://uptimeinstitute.com/publications; membership required.
3 Operational Sustainability and Its Impact on Data Center Uptime Performance, Investment Value, Energy Efficiency, and Resiliency, Uptime Institute. The paper can be found at http://uptimeinstitute.com/publications; membership required.

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