

For: Infrastructure
& Operations
Professionals

Strategically Locate Your Next Data Center

by Sophia I. Vargas, October 9, 2014

KEY TAKEAWAYS

Customer-Centric Service Design Starts With Your Physical Footprint

Customers today expect consistent performance anytime, anywhere, on any device. With application latency dictated by a complex combination of distance between resources and network proximity to data services, superior service design and delivery starts with your physical footprint.

Success Depends On Holistic Orchestration

Service quality perceived by your end users will depend on a multitude of moving parts, from technology sourcing, application architectures, and customer support to the design of the graphical interface. Successful improvements to your services will depend on a holistic strategy and common goals across constituents.



Strategically Locate Your Next Data Center

Where Your Technology Resides Can Make A Difference

by [Sophia I. Vargas](#)

with [Glenn O'Donnell](#), [Richard Fichera](#), and Andrew Hewitt

WHY READ THIS REPORT

In real estate, the most important factor is location, location, location! Your services are not quite as sensitive to the physical position of your technology, but location certainly can be a pivotal factor in optimizing your service design and service delivery. Ideally, location shouldn't matter; however, it does have an effect on customer experience. When technology services were simpler, location was largely irrelevant, but now the complexity of new services demands a strategy more in line with your BT agenda than your former IT agenda. The effects of regulatory, cost, risk, and performance factors will vary based on the physical location of your technology resources. Colocation providers, cloud service providers, and even traditional hosting services offer plenty of evolving options to help infrastructure and operations (I&O) professionals balance these factors to optimize service design and delivery.

Table Of Contents

- 2 **Location Constraints Are Disappearing**
- 3 **Design Your Ecosystem To Support Dependable Service Delivery**
- RECOMMENDATIONS
- 9 **Seamless Service Delivery Requires Design With Flexible Components**
- WHAT IT MEANS
- 10 **Others Will Handle Your Tactical Needs As You Focus On The Strategic**
- 10 **Supplemental Material**

Notes & Resources

Forrester used secondary data center sources and its Q1 2014 US Colocation Vendor Survey to write this report.

Related Research Documents

[Evolve Your Infrastructure Architecture For Systems Of Engagement](#)

July 25, 2014

[Consider Colocation As A Key To Your Holistic Data Center Strategy](#)

July 25, 2014

[The Software-Defined Data Center Is The Future Of Infrastructure Architecture](#)

November 12, 2012

LOCATION CONSTRAINTS ARE DISAPPEARING

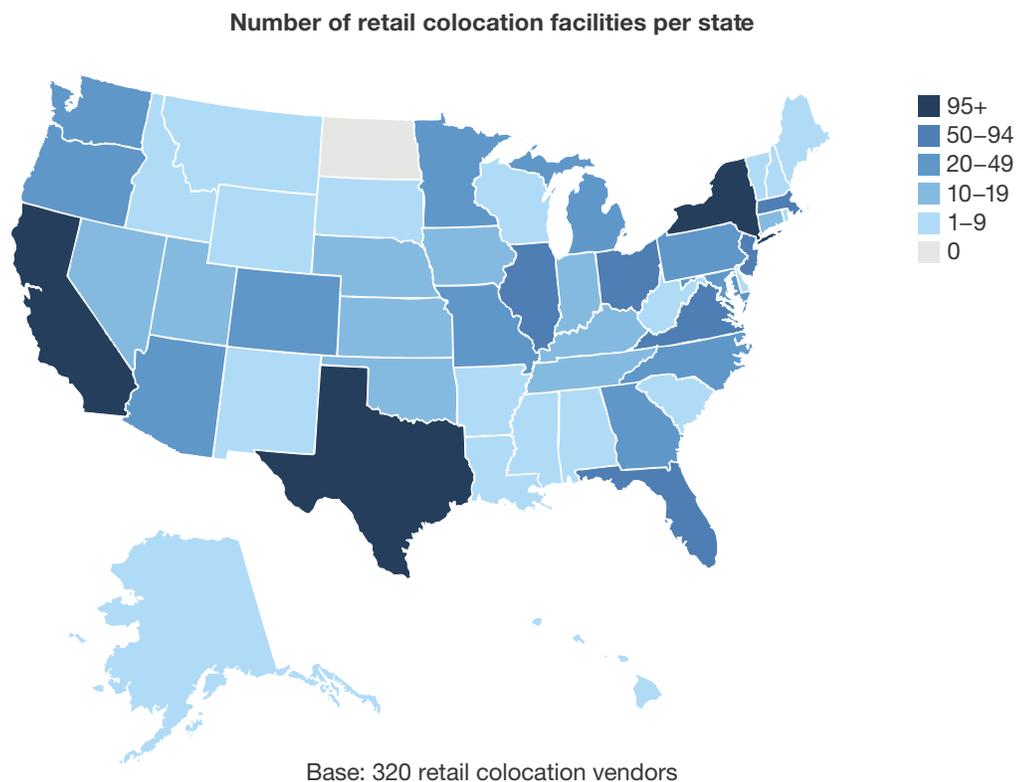
Given the high quality of infrastructure in the US today, data center proximity to company headquarters has become more about control and peace of mind than a requirement. To compete in the age of the customer, I&O organizations need to break away from the traditional mindset of defaulting to a location that is convenient to their workforce and instead consider locations that will deliver the best service to their customers. Selecting a new data center site has thus evolved from a tactical to strategic decision, given that:

- **Network performance is improving.** Technology management professionals continue to realize the benefits of virtualized compute and storage resources, and next up is the network. While network virtualization trails compute and storage, vendors today are actively developing new products to help their customers achieve the vision of virtualized network infrastructure (VNI), promising better management capabilities to deliver the speed and agility required by the modern business.¹ Emerging VNI and software-defined solutions combined with the strategic geographic placement of physical resources will help I&O professionals optimize service delivery.²
- **Colocation, hosting, and bespoke data center space is widely available and growing.** In the US alone there are over 1,430 distinct colocation facilities, totaling more than 100 million square feet of data center space spread across more than 330 cities, and many vendors continue to expand aggressively (see Figure 1).³ With such a large and sprawling market, competition has driven high standards into all modern facilities, challenging vendors to differentiate on more qualitative features like contract flexibility and amenities rather than equipment, resiliency, and certifications.
- **Remote monitoring and management tools have matured.** With a growing supply of management platforms, such as data center infrastructure management (DCIM), service management automation, and asset monitoring and management tools, more tasks and operations can be done remotely. The vision of the software-defined data center promises to abstract all management layers from the hardware itself, and new tools and integrations continue to advance capabilities in this direction.⁴ For example, IO Data Center's IO.OS can be integrated into VMware's vMotion and allow I&O professionals to move workloads to new hosts while monitoring asset inlet and outlet temperatures.⁵ This enables I&O professionals to maximize hardware utilization and efficiency without overheating their environment.
- **Security concerns about external hosting are unfounded.** The top concern in every study about external services (cloud or otherwise) has something to do with security.⁶ Many believe security can be controlled more rigorously if the services are hosted inside the physical walls of their facilities, but this is usually not the case. In fact, third parties are among the best at various aspects of security — from multi-level access control to bullet proof walls — given the high standards dictated by competition. And in any event, any concerns about allowing sensitive data out of your premises must be balanced against the reality of today's digital world. With the proliferation of digital services, proprietary and customer data constantly stream into and out of your network.

Coupled with the consolidated management plane provided by virtualization, a breach in the virtual layer will have much more dire consequences than a physical intrusion. Instead, I&O and security professionals should place the focus on securing the data, not the data center.⁷

Figure 1 Supply Hotspots: California, Texas, And New York

 The spreadsheet associated with this figure contains additional data.



Source: Forrester's Q1 2014 US Colocation Vendor Survey

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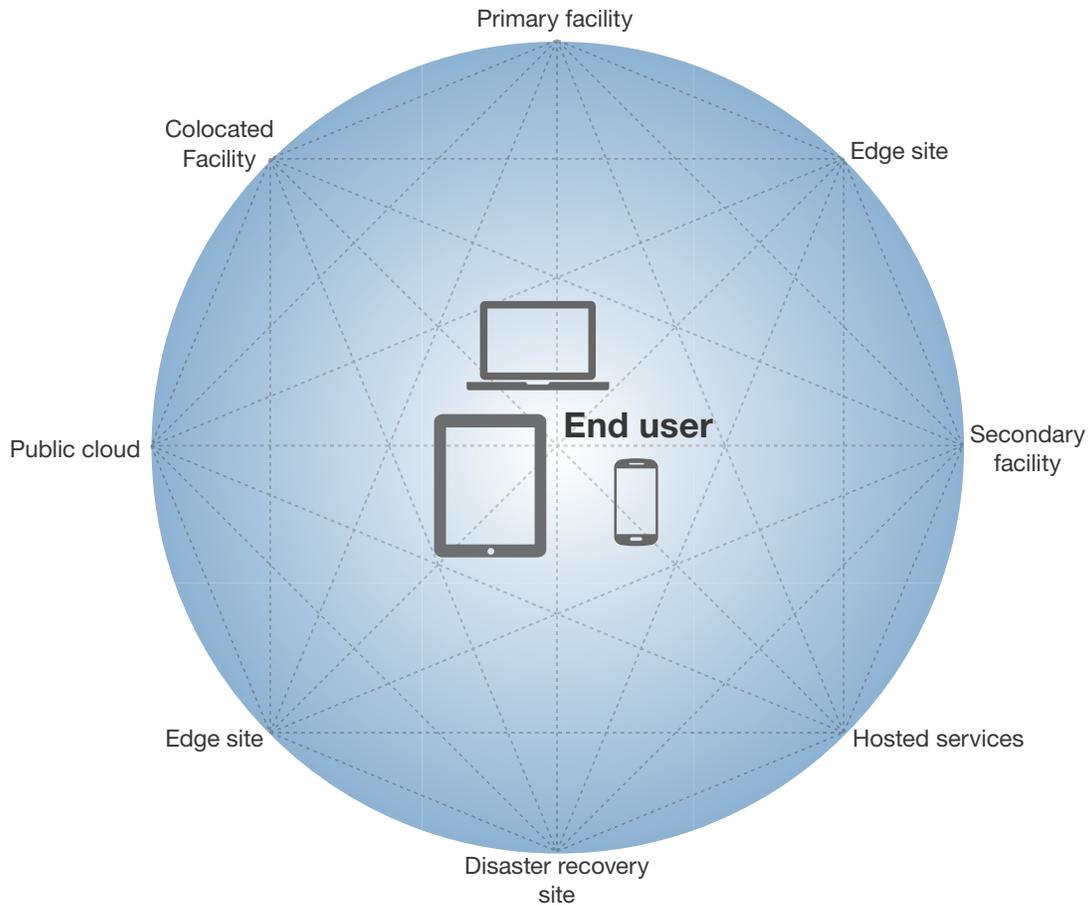
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DESIGN YOUR ECOSYSTEM TO SUPPORT DEPENDABLE SERVICE DELIVERY

With more services becoming digital, the success of the business is intertwined with the success of I&O professionals, who are challenged to provide a differentiated quality of service anytime, anywhere, and to anyone. Technology management is evolving from an IT agenda (heavily biased toward cost-cutting) to a BT agenda (more customer-centric to drive revenue). While dissatisfied employees turn to cloud services and shadow IT, customers will compare your services to their last best experience, and if your service doesn't meet or exceed that experience, they will simply go elsewhere. Since application latency is dictated by a complex combination of distance between

your own resources and their network proximity to critical external data services, customer-centric service design starts with your physical footprint (see Figure 2). As customer expectations continue to rise, delivering dependable services consistently across local and global users today will most likely require multiple sites and types of environments.

Figure 2 Build Your Technology Ecosystem To Support Customer-Centric Service Design



Align Site Selection Criteria To Future Customer And Business Requirements

Data center resources come in all shapes, sizes, and flavors: from wholly owned and operated to fully managed by others, and with variable contract lengths from 10 to 25 years for self-owned spaces, two to 15 years for colocation, all the way down to by the hour for public cloud services. While selecting the ideal sourcing mix is a complex exercise by itself, you can strategically narrow down potential locations by evaluating five criteria.⁸

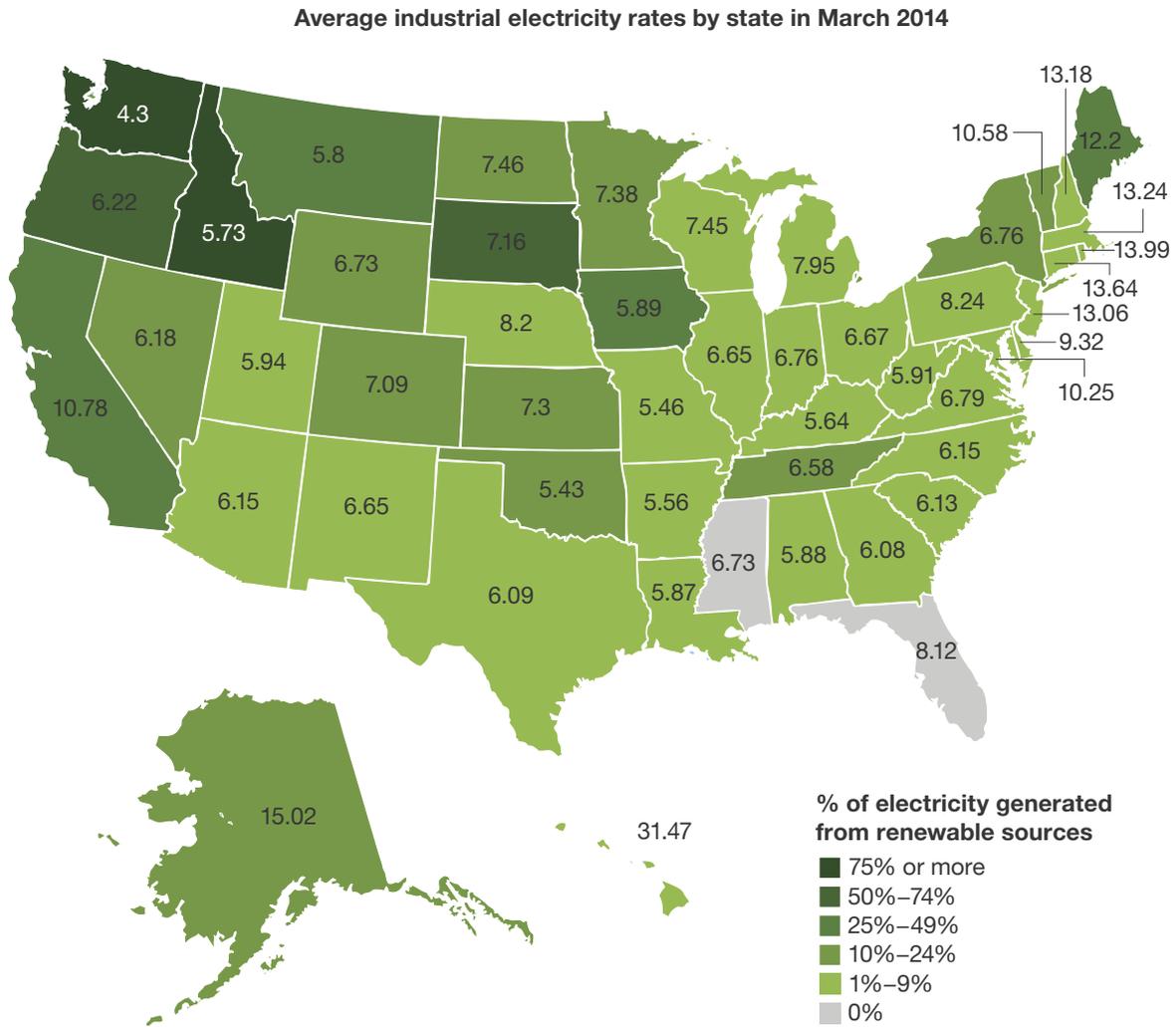
1. Cost: How Does Your Organization Want To Pay For Resources?

Given the price tag on data center facilities, cost will always play a key role in this discussion. It's not just about the total cost of ownership — a growing variety of outsourced services creates more opportunities to rebalance the ratio of capital to operational expenditures across your organization. While original equipment manufacturers (OEMs) will dictate the cost of infrastructure components, the facility costs will be most influenced by:

- **Real estate and taxes.** With 60% to 80% of monthly recurring costs at colocation facilities going to rent, choosing between city centers and suburbs will significantly affect your costs.⁹ Looking at this choice relative to light speed, the difference in latencies will be negligible except for the most latency-sensitive services.
- **Labor.** While the cost of labor is subject to local rates, organizations will also have to evaluate which competencies they want to keep in-house and which can be easily outsourced.
- **Utilities.** Even within the US, utility rates vary significantly by location and might sway location discussions given that the power bill can claim 35% to 60% of recurring facility expenses (see Figure 3).¹⁰

Figure 3 Energy Profile By State In Q1 2014

 The spreadsheet associated with this figure contains additional data.



Source: US Energy Information Administration

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2. Availability Of Resources: Can You Meet Your Business' Future Requirements?

With general uncertainty in future market dynamics, I&O professionals must integrate as much flexibility as possible into technology sourcing. Operations will need to be able to seamlessly scale to accommodate new products, services, and customers as dictated by the business. Agility in digital service delivery requires flexibility and availability of:

- **Space.** Over time, data center resources will need room to scale with demand, ideally without sacrificing efficiency in management or energy usage.
- **Skilled labor.** Depending on your destination of choice, you may have more or less access to skilled labor.
- **Power.** Data centers not built in purpose-designed facilities are often subject to the limitations of the building's infrastructure, as well as the quality of the grid and availability of multiple utility feeds. This will cap the potential capacity of the facility without significant investments to upgrade.
- **Bandwidth.** Considering uptime requirements and existing partnerships, you should select data center sites in tangent with your broader network strategy. As service delivery standards increase, I&O professionals will need to design and implement a flexible network mesh that can optimize routes in real time depending on current traffic and usage patterns.
- **Renewable energy and free air cooling.** Depending on the priorities of your organization, you may also consider the energy profile of potential destinations. With the latest American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) data center temperature recommendations, according to the Green Grid, 75% of North American locations can leverage free air cooling for data centers an average of 8,500-plus hours per year.¹¹ Electricity generation source materials also vary by state.

3. Regulation: Is Your Organization Prepared For Additional Legislation?

In this rapidly evolving information age, every country and region has taken a slightly different approach to data management policies and energy regulation. Industries have also created specialized certifications to promote the highest levels of security and privacy for their customers and employees. Forrester anticipates continued rapid evolution in:

- **Government policy and legislation.** In the past decade, lawmakers have scrambled behind the wake of technological progress to refine data policy and management. With each country subject to its own regulations, new data policies continue to develop independently across the globe, creating more complexity and uncertainty for globally dispersed organizations.¹² Given the current pace of change, most I&O professionals will plan for the most extreme cases — keeping all data in the country of operation — or procuring services from content delivery solution providers like Akamai Technologies that leverage complex caching processes that currently skirt around regulations.

- **Industry regulations.** Depending on your industry, your data center facility and operations may be subject to industry regulation and compliance certifications like SSAE16, PCI, FISMA, HIPAA, or HITECH. While many colocation vendors will claim to be compliant with some or all of these certifications, complete compliance will depend on your operations and policies inside the facility.
- **Climate policy and energy audits.** Each region has also developed independent laws and policies around energy usage, from the UK's Carbon Reduction Commitment to New York City's local law 87 (LL87), which mandates that buildings over 50,000 gross square feet undergo periodic energy audit and retro-commissioning measures.¹³ Given the growing urgency surrounding climate change, Forrester expects that more policies will emerge to quell and regulate large energy consumers. Given proclamations such as "if the cloud were a country, it would have the fifth largest electricity demand in the world," future regulations may significantly alter how organizations procure, source, and manage technology.¹⁴

4. Risk: What Is Your Organization's Risk Tolerance?

Every risk can be equated in financial terms — from the costs associated with disruption and repair to the decreased revenue from dissatisfied customers. And the larger the investment and relative business importance, the larger the risk to the business. Avoiding all potential threats to your technology ecosystem is impossible; the best that I&O professionals can do is diversify risk profiles at each site to lower the aggregate risk of all systems failing concurrently. When evaluating locations, consider:

- **Natural threats.** While infrequent, earthquakes, tropical storms, mudslides, winter storms, and wildfires can be detrimental to your business operations.
- **The political and social climate.** When expanding into additional countries, I&O, along with security and risk professionals, should evaluate the political climate to assess potential risks around corruption, crime, and social unrest.
- **Economic stability.** Economic instability can also harm operations that depend on local labor. Changes in GDP, inflation, and exchange rates will affect taxes, wages, and access to skilled labor.

Today, the largest reasons for downtime are operational — power, hardware, network, or software failure — followed by human error.¹⁵ While redundancies and proactive monitoring and management can help minimize operational failure, it will always be impossible to fully eradicate human error. However, I&O professionals can promote consistency with automation, standardized policies, and robust service catalogs to minimize mistakes.

5. Proximity: Where Are Your Users, Partners, And Prospective Markets?

At the end of the day, the business wants to create and deliver the best experience for end users and customers. From a technology sourcing perspective, this requires low-latency connections to end users and highly resilient infrastructure that can easily scale to meet dynamic demand. To meet these expectations, physical resources should be in network-dense locations and accessible to a bevy of potential partners to seamlessly extend your environment with cloud or managed services. Thinking about your future service design and delivery requirements, you should consider:

- **Service quality at the edge.** Traditional hub-and-spoke models with central sites won't be able to compete against agile and nimble competition. Consider instead a distributed model dictated by the location of your end users and the nature of your applications. Moving processing closer to the data will minimize the delay, and connectivity-rich sites will provide multiple routes to the end point.¹⁶
- **Accessibility to additional services.** While you might still own and operate all of your infrastructure today, chances are high that you will need some form of hosted, managed, or cloud services in the near future. If you are evaluating colocation for your next facility, consider providers like Equinix and Telx that offer direct-connect services into cloud and partner environments available in the same or nearby location.
- **Business continuity and disaster recovery strategy.** Depending on your business continuity and disaster recovery strategy, site location might be dictated by a 100 kilometer limit on synchronous replication used in active-active configurations. However, for asynchronous or hot-cold models, disaster recovery and production sites need only be located in zones with distinct risk profiles with viable and redundant connections between them. For latency-sensitive applications, make sure that both production sites and disaster recovery sites are located within tolerable distances from their user base.

RECOMMENDATIONS

SEAMLESS SERVICE DELIVERY REQUIRES DESIGN WITH FLEXIBLE COMPONENTS

The service quality perceived by your end users will depend on a multitude of moving parts, from technology sourcing, application architectures, and support to the design of the graphical interface. Success will depend on a holistic strategy and common goals across constituents and might include an upheaval of current structures and procedures. As you develop your physical strategy:

- **Reevaluate your network architecture and strategy.** Amid the growing complexity of your technology ecosystem, more data is crossing your network than ever before, and it will only increase. Factors include multiple locations, a mix of private, public, and managed infrastructure, not to mention your growing mobile workforce and explosion of Internet-

connected devices. While compute nodes and storage volumes can be scaled, you'll need to redesign networking architectures to keep up with the rest of the hardware improvements. VNI and software-defined network solutions promise to overcome this bottleneck, but many organizations are far from ready to take advantage of the tools currently available in the marketplace.¹⁷

- **Design applications for consistent customer experience.** Consider architectures that build resiliency into your service at the application layer, whether that's leveraging active-active or hot-cold site configurations. The key properties are mobility and scalability — being able to seamlessly move workloads across hosts or dynamically scale up or down depending on usage.
- **Orchestrate holistic management across a hybrid environment.** As sourcing strategies become more heterogeneous, containing multi-vendor hardware across the globe, a single authority with visibility into the entire ecosystem needs to dictate management. While no complete software-defined platform exists, organizations can work to create a single perspective through clever integration of a variety of tools and platforms.

WHAT IT MEANS

OTHERS WILL HANDLE YOUR TACTICAL NEEDS AS YOU FOCUS ON THE STRATEGIC

Your data center is undeniably strategic because the resources housed within it are core to your digital business execution. How you manage much of this real estate is less strategic, however. If someone else can perform these tactical functions better and cheaper than you can, you are free to allocate your people to the work that makes your enterprise superior. As the quality and robustness of services increases, expect to extend this argument throughout the rest of your technology ecosystem, retaining only the core competencies of your business and employees.

What happens inside a data center might actually be tactical (e.g., server management, environmental), but the choices you make for locating the workloads is strategic indeed. Focus on the higher-level architecture, which includes the physical placement of infrastructure services, including those you do not own. This will relax your reliance on your IT agenda and feed your BT agenda.

SUPPLEMENTAL MATERIAL

Methodology

Forrester's Q1 2014 US Colocation Vendor Survey included 327 colocation providers with operations in the US. From October through December 2013, 430 potential vendors were identified and evaluated. Vendors qualified for this study if they provided retail or wholesale colocation services within the US. Vendors were excluded if websites were inactive, dated before 2011, or if they had been acquired.

Twenty-two vendors voluntarily completed an in-depth survey, providing information on their solution and services including the location, size, and features of all current and planned data center facilities supporting colocation services. Information on the remaining 305 vendors and facilities was collected from their website from January to March of 2014.

While the goal of this study was to provide a comprehensive overview of the US colocation market, the sample is not exhaustive. Forrester did not include vendors that were not identified during the evaluation period due to the imperfect nature of discovery through search engines and public profile site.

ENDNOTES

- ¹ Five years after introducing network fabrics, the networking industry has hit the reset button. Vendors haven't come any closer to helping customers build networks that can instantly mesh users, data, and applications — a critical capability in a world moving toward mobility and cloud. As a result, the industry has turned its attention to software-defined networking (SDN) as the key ingredient of an infrastructure that is standardized, automated, self-service, and multitenant. The following report profiles three forcing functions that will help infrastructure and operations (I&O) leaders shape a next-generation network that supports the innovation that businesses need. See the June 9, 2014, "[Three Forcing Functions That Will Extend Your Data Center's Network Services Beyond Its Walls](#)" report.
- ² For more information on how vendors are actively helping their customers to achieve VNI, please see the July 25, 2014, "[Evolve Your Infrastructure Architecture For Systems Of Engagement](#)" report.
- ³ The following report discusses the tactical and strategic elements of sourcing your technology ecosystem. It also presents an overview of the US colocation market, highlighting results from Forrester's Q1 2014 US Colocation Vendor Survey, which investigated the solutions and facilities of 327 colocation providers with operations in the US. See the July 25, 2014, "[Consider Colocation As A Key To Your Holistic Data Center Strategy](#)" report
- ⁴ The potential impact of SDDC products is immense, offering an integrated architecture that allows the merger of legacy architectures, cloud computing, and workload-centric architectures into a single manageable domain. To help I&O professionals understand this future vision, the following report defines the SDDC, the opportunity, and the emerging vendor landscape. For more information, please see the November 12, 2012, "[The Software-Defined Data Center Is The Future Of Infrastructure Architecture](#)" report.
- ⁵ IO.OS is a data center infrastructure management (DCIM) solution that enables you to monitor and manage your data centers for capacity, space, power, cooling, and IT from a single perspective. Source: IO Data Centers (<http://www.io.com/dcim/>).
- ⁶ This data point is broken down further in a recent Forrester report on cloud adoption. For more information, please see the September 19, 2014, "[Benchmark Your Enterprise Cloud Adoption](#)" report.

- ⁷ Two specific Forrester reports deal with external hosting security. For an in-depth guide to this process, please see the December 31, 2013, "[An S&R Pro's Guide To Security To, In, And From The Cloud](#)" report. For procedural help in building this model, please see the June 5, 2014, "[The Future Of Data Security: A Zero Trust Approach](#)" report.
- ⁸ For a guide on what applications I&O professionals should consider moving to the cloud, please see the May 24, 2012, "[Rightsource Your Applications For The Cloud](#)" report.
- ⁹ For an overview of the costs involved in data center facilities, please see the June 27, 2011, "[Build Or Buy? The Economics Of Data Center Facilities](#)" report.
- ¹⁰ Forrester created a method to calculate the ROI of data center investments. For more information, please see the August 26, 2013, "[Calculate The ROI Of Data Center Investments](#)" report.
- ¹¹ This statistic comes from Green Grid's white paper No. 45. Source: "Updated Air-Side Free Cooling Maps: The Impact Of Ashrae 2011 Allowable Ranges," The Green Grid, March 6, 2012 (<http://www.thegreengrid.org/~media/WhitePapers/WP46UpdatedAirsideFreeCoolingMapsTheImpactofASHRAE2011AllowableRanges.pdf?lang=en>).
- ¹² Data security regulations vary from country to country. For an in-depth look at the strictest and loosest countries in the world, please see the August 6, 2014, "[Forrester's 2014 Data Privacy Heat Map](#)" report.
- ¹³ More information on these policies and laws is available on government websites. Source: "CRC Energy Efficiency Scheme: Qualification and registration," UK Environment Agency, April 8, 2014 (<https://www.gov.uk/crc-energy-efficiency-scheme-qualification-and-registration>) and "LL87: Energy Audits & Retro-commissioning," Government of NYC press release (<http://www.nyc.gov/html/gbee/html/plan/ll87.shtml>).
- ¹⁴ The National Mining Association has written excellent material on this issue. Source: Greenpeace (<http://www.greenpeace.org/international/Global/international/publications/climate/2012/iCoal/HowCleanisYourCloud.pdf>)
- ¹⁵ The benchmarks found in this report are the result of several years of market studies on business continuity and disaster recovery developed in partnership with Forrester and the Disaster Recovery Journal. Please see the May 12, 2014, "[The State Of Business Technology Resiliency, Q2 2014](#)" report.
- ¹⁶ A recent Forrester report lays out emerging best practices for building an architecture that can scale as your business demands accommodate the growing focus on customer engagement and experience. For more information, please see the July 25, 2014, "[Evolve Your Infrastructure Architecture For Systems Of Engagement](#)" report.
- ¹⁷ I&O professionals should use the following report to understand emerging demands that only software-defined networking can fulfill, the relationship between virtual network infrastructure (VNI) and SDN, and, finally, the vendor landscape of SDN solutions. For more information, please see the March 5, 2014, "[Is Software-Defined Networking Ready For The Enterprise? Part 1 Of 3](#)" report.

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