

FOR: Infrastructure
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Professionals



Market Overview: Data Center Infrastructure Management Solutions

by Richard Fichera, March 29, 2012 | Updated: April 3, 2012

KEY TAKEAWAYS

Unrelenting Pressures Drive Continual Pursuit Of Operational Efficiency

The fundamental pressures driving IT I&O groups have not changed for many years. Pressures on raw operational efficiency continue, with increased emphasis on both labor cost containment and power reduction. Today a solid and functional DCIM solution is needed more than ever to manage complexity and drive operational excellence in the data center.

The DCIM Supplier Landscape Is Dominated By Three Major Types Of Suppliers

The DCIM supplier landscape is complex because DCIM has its roots in multiple technologies from a fragmented vendor landscape. Forrester sees three distinct clusters of vendors: data center facility and infrastructure vendors; IT management vendors; and systems hardware vendors. Therefore, I&O groups must take a close look at existing solutions to understand how their requirements may evolve over time.

New DCIM Solution Will Add Complexity To The I&O Professional Role

Survey data shows that the I&O job will be more challenging in the future. As DCIM solutions advance beyond basic functionality, I&O professionals will have to deal with complex and intertwined tasks. By accepting the complexity of the new solutions, they can deliver more robust, efficient, and cost-effective data centers to the business.



Market Overview: Data Center Infrastructure Management Solutions

Maturing Solutions Allow Integrated Physical Management Of The Data Center

by [Richard Fichera](#)

with [Doug Washburn](#) and Miroslaw Lisserman

WHY READ THIS REPORT

This report is part of the data center infrastructure playbook and should be read by IT infrastructure and operations (I&O) professionals. Data center infrastructure management (DCIM) is a comprehensive approach to managing the physical aspects of the data center. DCIM is the convergence of previous generations of purely facilities-oriented power management, physical asset management, network management, and financial management and planning solutions for data centers. If used properly, DCIM solutions can help I&O professionals address steadily ratcheting pressures to meet business SLAs, lower costs, and improve resource and energy efficiency and long-term facilities planning. The steady drumbeat of escalating requirements will drive DCIM offerings rapidly, with increased integration with other enterprise management tools. I&O groups will have to become adept at matching their requirements to the rapidly changing offerings but will need some form of DCIM solution to remain competitive.

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Notes & Resources

Forrester interviewed 14 vendor and user companies, including Attend Systems, CA Technologies, Cormant, Emerson Network Power, HP, IBM, Innovolt, Interxion, IO, nlyte Software, Panduit, Romonet, Schneider Electric, and Vantage Data Centers.

Related Research Documents

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PRESSURES DRIVE CONTINUAL PURSUIT OF OPERATIONAL EFFICIENCY

The fundamental pressures driving IT I&O groups have not changed for many years (see Figure 1). Pressures on raw operational efficiency continue, with increased emphasis on both labor cost containment and power reduction. Additionally, the continuing metamorphosis of IT into business technology (BT) continues as more enterprises realize that not only does their business rely on technology, but in many cases, technology completely dominates their ability to deliver products and services.¹

With this transformation comes even more emphasis on the entire technology management chain, including areas that have been relatively invisible in the past, notably the integrated management of the physical facilities, power, and cooling elements of the data center throughout their entire life cycle using tools that Forrester characterizes as data center infrastructure management (DCIM) solutions. Based on Forrester survey data and interviews with both vendors and buyers, I&O professionals are investing in DCIM to:

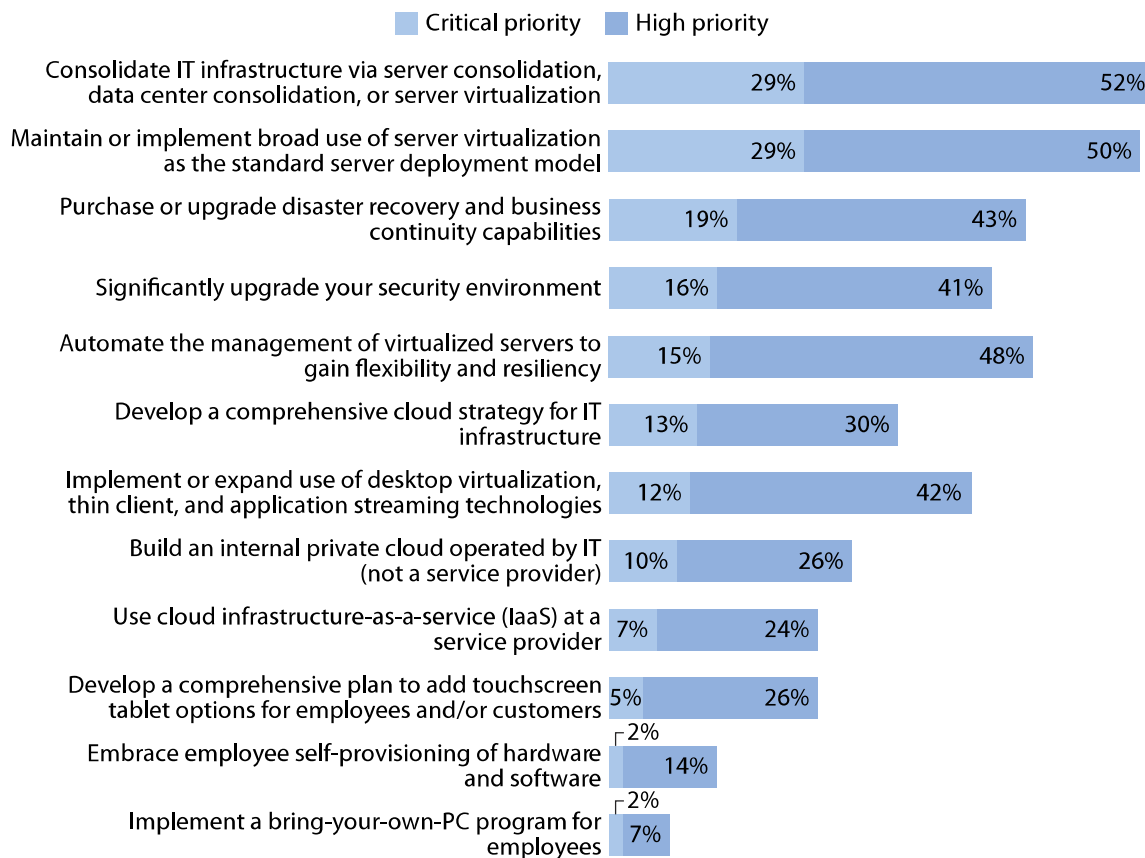
- **Improve availability.** Efficiency cannot come at the expense of resiliency. The ultimate measure of success for an I&O group is the availability of services that meet increasingly stringent service-level agreements (SLAs). As one vendor said, quoting a customer, “If our data center becomes more efficient, then we get a pat on the back. If the data center goes down, we get fired.” As it turns out, Forrester finds that power failure is the most common cause of significant disaster declarations or major business disruptions — not extreme scenarios like terrorism or severe weather conditions.² DCIM solutions help prevent critical problems that can threaten availability by improving the visibility of potential bottlenecks in the infrastructure, particularly critical power and cooling, and by providing the means to rapidly alert operational staff to problems, as well as mediating responses.
- **Manage capacity constraints.** Virtualization and cloud computing bring a new dimension to IT operations: a choice in how services will be delivered to the business. However, new data centers are expensive and disruptive, and being forced to move prematurely to the cloud or an outsourced service provider can be disruptive. Capacity planning must change to reflect this evolution: It now becomes a key part in delivery platform selection. The ability to understand the impact of future workloads and infrastructure changes on potential capacity requirements is extremely valuable for many organizations. DCIM can help by providing the ability to model proposed changes and allow I&O groups to look at changes in cost and resources required. The ability to defer a data center acquisition cycle can pay for the DCIM investment.
- **Lower operating costs.** Optimizing energy consumption is important both for financial reasons and to assuage emerging regulatory pressures (more so in Europe than North America, currently). While the overall design of the data center has a significant impact on overall energy efficiency, a DCIM solution will allow any data center to gain insight into, and potentially the ability to improve, its energy consumption. DCIM can help by analyzing

and recommending optimum equipment placement for maximum efficiency. One customer reported a savings of approximately 30% in cooling costs just by implementing control of variable-speed fans on the computer room air conditioner (CRAC) units.

- **Improve capital resource efficiency (capex management).** Nonvirtualized servers and most storage are poorly utilized in the average data center, and I&O groups are under continual pressure to maximize resource utilization. For example, 30% of servers in data centers are considered dead — that is, servers consuming energy but with utilization rates at 3% or below.³ Virtualization has become a widely accepted improvement to resource utilization, but planning and understanding the impact of large virtualization initiatives has been complex, time consuming, and often inexact. DCIM can help by providing accurate models for virtualization deployments, including both physical resources and detailed cost models.
- **Provide detailed financial modeling.** Legacy data center management has focused on the major operational problems — assets, power, cooling, and control. In addition to improving these aspects of IT operations, there are increasing pressures to understand the fine-grained cost structure of the data center. Beyond costs, I&O executives are increasingly pressured to connect costs in the data center to business value delivered, since much of overall spend is allocated to MOOSE — the cost to maintain ongoing operations, systems, and equipment — that typically consume about 70% of budgets.⁴ DCIM can help by providing very accurate cost models for actual and proposed data center investments.
- **Manage their carbon footprint.** A consideration that varies by geography, industry, and organizational priority, and one that is not a top-tier driver yet, carbon footprint management looms as a potential regulatory issue as more countries begin to scrutinize carbon emission caps, offsets, and trading. With enterprise carbon and energy management (ECEM) solutions that measure and manage energy across the entire enterprise, DCIM can provide data for carbon footprint monitoring in the data center.⁵ This is particularly important for services-based organizations, such as financial services, where the data center is a significant portion of overall enterprise energy consumption.

Figure 1 The Q3 2011 Hardware Survey Confirms The Importance Of Infrastructure

“Which of the following initiatives are likely to be your firm’s/organization’s top hardware/IT infrastructure priorities over the next 12 months?”
(Percentage of respondents who answered “critical priority” and “high priority”)



Base: 650 North American and European enterprise IT hardware decision-makers

Source: Forrsights Hardware Survey, Q3 2011

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Source: Forrester Research, Inc.

MAJOR FUNCTIONAL CRITERIA DEFINE DCIM SOLUTIONS

Because DCIM is an emerging solution space, the functionality of DCIM solutions is rapidly changing as offerings mature and user requirements drive vendors to fine-tune their offerings. While we have roughly grouped the solution capabilities into two main clusters, core functions and emerging capabilities, potential DCIM users must assume the responsibility for mapping their requirements to these functional clusters, since individual requirements will differ and the tools are changing rapidly.

Eight Core Functions Define Basic DCIM Functionality Today . . .

DCIM solutions consist of tools that focus on the management of the physical data center infrastructure — power, cooling, physical layout, and inventory. More advanced DCIM incarnations attempt to bridge the gap between traditional facilities management and operational IT management by including workload management, generally in the form of VM-aware power analysis and placement advice. Although products and vendor alliances are rapidly evolving, Forrester defines the following rough taxonomy of functions for DCIM software that I&O professionals should seek out:

- **Inventory and discovery.** Cited as one of the top-level drivers for DCIM implementation, an asset management function is something that all DCIM solutions have, but initial implementation is often messy and labor-intensive since the majority of organizations still have most of their configuration data embodied in spreadsheets. Most vendors claim some level of automated inventory capture and import from existing configuration management databases (CMDBs), and in some cases, spreadsheets. But buyers should expect the initial loading of the asset database for their DCIM installation to be relatively labor-intensive, such as staff walking the rows of the data center to manually collect data for the initial installation.

Once installed, realize that asset management is not a passive function. As the assets are discovered, the DCIM solution must be able to construct the necessary relationships and dependencies between them, such as the relationship between circuits and power distribution units (PDUs), and the relationship between PDUs and racks and connected equipment. These relationships are vital for power and cooling management and planning. Integration with mobile or handheld devices is a highly desirable feature for the asset and management functions of a DCIM solution.

- **Maintenance and change control.** Once the data is correctly collected, the ongoing maintenance and change control is vital. DCIM vendors vary in their ability to perform change control, but at a minimum they need to be able to: 1) update their own configurations based on operator actions; 2) create a list of change actions as a result of any what-if scenarios they generate; and 3) allow the generation of work orders in existing ticketing systems. With that in mind, an obvious requirement for successful asset management and change management is the ability to communicate with other enterprise asset management systems.
- **Data collection.** Once the DCIM software is installed, it needs to collect data from the environment. The solution collects real-time physical infrastructure data, including physical rack and equipment location, circuit capacities, CRAC and cooling data, and thermal data from the equipment of multiple, and, in many cases, competing vendors, along with data from other sources including other CMDBs. The granularity of the data collection, the type of database in which it's stored, and the extent to which it can be used for other analyses are characteristics that differentiate the vendors. One major juncture in product design is whether

the data is collected continuously in real time as it is generated by the monitored devices or whether it is polled by the software. Prospective users need to understand the differences in these approaches and the implications for the kind of management capabilities enabled by each method (see Figure 2).

- **Consolidated monitoring and display dashboard.** One of the earliest functions of DCIM software was as a unified dashboard display or report that showed a single-source view of power, physical, and thermal information. This initial bridging of the worlds of facilities and IT operations was one of the initial selling propositions of the first generation DCIM applications and continues to be a focus of many DCIM products. For example, I&O professionals are interested in the rack locations and power consumption of individual IT components, while facilities management is accustomed to a line diagram that displays a simplified rendition of the power chain, from utility feed through intermediate UPS and distribution to the final rack-level PDUs. All comprehensive DCIM solutions can be expected to provide these and other views on demand.⁶
- **Alerts.** In addition to the display of status and dashboards, the generation and display of alerts is a critical function and addresses a critical set of DCIM functions, the processing and interpretation of the data. The data volumes involved in DCIM solutions are high, and even more importantly, the interpretation of the results of this data collection so that it can be presented in an easily consumable format is one of the most critical aspects of the DCIM solution. Data must be aggregated, filtered, and then correlated across multiple sources, and over time present actionable knowledge to the operators. The intelligence behind the filtering and correlation and the ability to easily generate complex custom rule sets is one of the major competitive areas among DCIM vendors. Needless to say, all claim to do this very well, and it is incumbent upon I&O groups to define the conditions for which they anticipate needing alerts and displays.⁷
- **Control.** The ability for the DCIM console to reach out directly and control the infrastructure elements is not required but is desirable.⁸ All products provide some level of control, and the granularity of the control functions and the breadth of elements controlled are differentiators. One of the strengths of some of the major infrastructure providers such as Emerson Network Power and Schneider Electric is that they supply many of the critical data center infrastructure elements, and their libraries are correspondingly rich. Their understanding of their own devices should also be optimal.

With that said, Forrester has observed a definite gap between the ability of emerging DCIM solutions to provide active closed-loop control of infrastructure, in some cases even down to the level of scheduling VMs, and the willingness of consumers of DCIM solutions to enable these capabilities. In many ways this mirrors the early days of VMs, when advanced tools such as VMware's vSphere Distributed Resource Scheduler (DRS) were available but users were initially

leery of allowing them to run without human intervention. DCIM for most organizations is a long march, starting with DCIM as an organizing principle to get a single view of assets then progressing through use of aggregate displays and monitoring through more elaborate use of trend analysis and planning tools, with full-blown automation a vision as opposed to reality for most customers today.

- **Trend analysis.** The next major step in functionality is the ability to display trends for power and cooling as well as predict and diagnose conditions that have exceeded preset limits. Historical trend data is largely a function of what data is collected and the flexibility of the interface. Most products allow some flexibility in collecting and displaying data. The details of any predictive displays can be complex, since the robustness of the underlying forecasting algorithms can be hard to discern. Forecasts based on simple statistical models, with or without periodicity, are much less useful than models that take input from a workload planning function that understands future infrastructure changes.
- **The ability to model future solutions for implementation.** This is still a work in progress for most vendors, but the ability to model potential solutions to power and workload problems is one of the areas where the systems vendors and infrastructure equipment suppliers are intersecting. To effectively propose an optimal set of allocations, the software needs to understand the behavior of the system at a granular level, the potential workloads, and the details of the power and cooling environment. This capability has traditionally been supplied by systems vendors and high-end IT systems management independent software vendors (ISVs) such as HP, CA Technologies, and BMC Software, and it is now appearing in many of the DCIM offerings as well. The degree to which the potential solution simulations are aware of the underlying workloads and the accuracy and granularity of the simulations are all differentiators.

Figure 2 Understanding The Differences Between Polled Data Versus Real-Time Data

Data collection method	Advantage	Disadvantage
Polled data collection at intervals of several minutes to several times per hour will allow for the development of accurate trending data, an understanding of patterns of data center heating and cooling, and the adjustment of CRAC and chillers for most environments.	One advantage of polling schemes is that they can be implemented in purely software solutions that talk to installed hardware with no additional equipment required.	It will not allow for rapid response to transient events.
Real-time data collection is event-driven and requires additional hardware elements in the form of dedicated data collection modules, usually implemented as small servers with extensive I/O interfaces.	Allows for the ability to perform continuous monitoring and the ability to perform all of the trending functions of a polling system plus the ability to respond to rapid transients.	In addition to being more costly, real-time collection often amasses too much data, and users must specify filtering and aggregation policies or use vendor-supplied defaults.

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Source: Forrester Research, Inc.

... But Keep An Eye On Emerging Functions That Will Drive Differentiation Tomorrow

In addition to the core functions detailed above, additional capabilities are being added by vendors to satisfy advanced user requirements and establish competitive differentiation. Among the advanced functions Forrester sees emerging are:

- **Power planning and capacity based on actual, not rated, usage.** In most cases, the power consumption and planning information that basic DCIM offerings provide is nominal information, based either on the nameplate rating of the component from a library or from the user's configuration files. A far more useful method of reporting and planning power is to use actual consumption. Actual power consumption can be read at a number of levels of the infrastructure, from PDUs down to actual individual systems. Ideally the DCIM solution can reach into the system and get granular data on actual power usage and workloads to enable more accurate global power management. The ease of collecting this low-level data and the flexibility in aggregating, reporting, and acting on it will be differentiators.
- **Workload-aware modeling.** The ability to see actual workloads running on the individual servers in a data center and to make intelligent modeling decisions based on assumptions about software workloads as opposed to physical systems is a desired feature on a DCIM solution. Its implementation varies widely across vendors, and currently there are only a few vendors that have a comprehensive ability to make inferences about the loads imposed by VMs of specified sizes. This will be an opportunity for strong differentiation among vendors since many of the vendors, notably HP, CA, and IBM, have extensive performance modeling tools for allocating VMs across servers that are not yet integrated into a complete DCIM offering.

- **Network capacity modeling.** Only a few vendors, notably Panduit and Emerson, offer any kind of network capacity planning capabilities beyond simple inventories of ports. A deeper integration with data from the switches in the infrastructure would extend the capabilities of DCIM solutions in conjunction with workload-aware modeling. Among the functions that are highly useful in the network realm are the ability to discover network devices and connections and collect information on network traffic. The desirability of embedding selected network management within the DCIM framework seems to be controversial, both among users and vendors. One side argues that control of network devices beyond simple power management functions is a natural extension of DCIM, while the other side of the argument is that network management functions are already implemented in an existing framework, and having multiple touchpoints for network management is a potential operational and security exposure.
- **Integration of DCIM with conventional IT management tools.** The integration of DCIM with conventional system, application, and network management tools is a work in progress, and the competitive battle among DCIM vendors will likely be defined by the degree to which this integration can be made seamless and useful for I&O professionals. Currently CA stands out as having integrated a multiple of its management software modules along with selected acquisitions into a very comprehensive DCIM software offering.

THREE MAJOR TYPES OF SUPPLIERS DOMINATE THE DCIM SUPPLIER LANDSCAPE

The supplier landscape for DCIM solutions is different from that of many previous technology cycles. Unlike many other technology solutions, DCIM is not a niche problem and has its roots in many interlocking technologies, ranging from chillers and CRACs through systems to the underlying semiconductor manufacturers. As a result, Forrester identifies three distinct clusters of vendors: data center facility and infrastructure vendors; IT management vendors; and systems hardware vendors. As DCIM vendors and their offerings mature, this taxonomy is subject to fairly radical change over time, and in some cases vendors may occupy more than one niche.

Forrester has listed the primary DCIM vendors with a short description of the primary product offerings. In addition to vendors offering standalone DCIM suites, we have also included several hosting providers whose hosting offerings incorporate either proprietary or third-party DCIM solutions as examples of potential end-state target data center environments.

Data Center Facility And Infrastructure Vendors With DCIM Offerings

The traditional power and cooling system vendors, notably Emerson and Schneider/APC, have been early players in DCIM. These generally have tight integration with the infrastructure side of the data center and offer very high-capacity data collection capabilities. This group also includes successful but relatively low-profile specialty suppliers such as Panduit. Forrester believes that Emerson

Network Power and Schneider Electric are currently the dominant suppliers in the DCIM market as it exists today. Key infrastructure vendors that I&O professionals should consider include:

- **Emerson Network Power.** Emerson's Trellis platform is a new real-time infrastructure optimization platform that enables the unified management of the data center's IT and facilities infrastructure. The core component is the Avocent Universal Management Gateway, a multipurpose appliance that connects to facility and IT equipment for both data collection and control functions. The Gateway is the core component of the Emerson solution stack. Today, the closed loop control is supported through DSView Management Software, but in the future will be available in the Trellis platform. The Gateway combines the functions of KVM over IP, serial console over IP, rack PDU, SP, and environmental management in a single chassis. When used in combination with DSView Software, the solution provides remote access and control to any device that can be controlled by any of the consolidated functions. The Trellis platform also provides network management and control capabilities as a result of its Avocent IP content, and can manage capacity, track inventory, plan changes, visualize configurations, analyze and calculate energy usage, and optimize cooling/power equipment and enablement for virtualization.
- **IO.** Originally a dedicated hosting and colocation provider, IO is branching out into manufacturing its own custom modular data center products that included IO.OS, its own DCIM solution. IO is now offering IO.OS as a standalone offering, either as a conventional software installed on customer premises or as a cloud-based service. IO.OS is focused on physical infrastructure management, reporting, and control, and is one of the products that has opted for an abstracted schematic interface as opposed to a visually realistic representation of the physical data center equipment. Our views of IO.OS in a demonstration were enough to convince us that it has hit on an almost Apple-like ease of use in its interface, which allows extremely fluid navigation and control of a distributed infrastructure.
- **Panduit.** Physical Infrastructure Manager (PIM) software platform is a physical infrastructure management system for tracking the allocation and utilization of IT assets. PIM documents physical assets, tracks moves, adds, and changes (MACs), and can integrate with external management systems. Panduit emphasizes PIM's centralized collection and representation of asset attributes, such as connectivity, space, port availability, and power plus environmental, the use of this data to optimize the data center's space, power, and cooling resources. PIM does not appear to have strong predictive and scenario modeling capabilities.
- **Schneider Electric.** Schneider's flagship product, StruxureWare for Data Centers, is an integrated DCIM offering with strong real-time data collections capabilities as well as simulation and control capabilities. In many ways mirroring much of the functionality of rival Emerson, StruxureWare had its origins in data collection, power and cooling analysis, and management and has added complex scenario analysis planning, VM-aware analysis, and

detailed financial modeling. Schneider's acquisition of Veridity is expected to extend Struxure's reach further up the system software and VM-layer stack.

IT Management Vendors With DCIM Solutions

Established software IT vendors such as CA, along with entrants such as nlyte Software, specialized vendors like Romonet, and others have varying degrees of software-only offerings that offer DCIM functionality. Likewise, Microsoft has added basic power management capabilities to Windows management and will probably improve them over time. Key management solution vendors that I&O professionals should consider include:

- **CA Technologies.** CA's ecoSoftware offers a very rich set of DCIM products integrated into a common console. CA appears to have integrated IP and product modules from selected portions of its broad portfolio of management products, and as a result offers an impressive menu of capabilities in a pure software-based product. The product extends from core data center infrastructure to network and desktop integration and has rich reporting, planning, and probably the most comprehensive set of filtering and correlation capabilities of the group, most likely due to CA's extensive network management portfolio. CA ecoSoftware also offers excellent integration with both CA and third-party enterprise system and networking products.
- **Cormant.** CableSolve emphasizes asset management and documentation, with a strength in understanding cabling and network assets at a logical as well as physical layer. CableSolve provides complete visibility into the physical layer, including all assets and connectivity along with live, logical layer data from SNMP, WMI, and XML devices. CableSolve also has strong mobile device integration capabilities.
- **nlyte Software.** In business since 2003, nlyte offers the basic DCIM functions and has a very strong patented scenario planning capability with the ability to reserve capacity and generate work orders against the planned scenario, as well as financial analysis and thermal modeling capability. Nlyte also has an entry offering for smaller data centers and offers its product on a perpetual or subscription basis.
- **Rackwise.** Rackwise Data Center Manager (DCM) is a comprehensive DCIM suite consisting of data center essentials, data center intelligence, and data center optimization. The suite of software appears to deliver all of our basic criteria and many of the emerging capabilities reviewed above.
- **Romonet Software.** While not a full DCIM product per se, Romonet offers a very flexible and powerful financial modeling tool tailored for data center operational calculations spanning the entire supply chain. Romonet uses a database of vendor-specific information combined with a flexible modeling capability to enable calculations such as build versus buy, effects of

infrastructure changes, virtualization/consolidation decisions, and modeling in-house versus cloud deployments. Romonet Software Suite is available as a standalone product and is also licensed by other DCIM providers as an embedded module in their products. Romonet is the only product Forrester is aware of that can model the costs of complex software service extending across the data center infrastructure, including models of its performance and power consumption.

- **Sentilla.** Sentilla's eponymous product is focused on detailed data collection and analysis, with interfaces to multiple CMDBs and other enterprise management software. Sentilla's strengths appear to be in the analysis and planning, both of the physical infrastructure, applications, and services, as well as the financial aspects. Sentilla emphasizes both real-time and historical/trend data collection. Sentilla does not, except via its ability to be invoked by other workflow and systems management products, directly control IT infrastructure.

Systems Hardware Vendors With DCIM Offerings

All of the major systems vendors, including HP, IBM, and Dell, have at least point product offerings in the DCIM arena. These offerings from the major systems vendors are of varying degrees of completeness and generally lag those of the specialized DCIM vendors. However, the major vendors have a wide range of IP, ranging from instrumented PDUs and racks to comprehensive server management and workload-aware planning tools coupled with an extremely granular power management capability at the enclosure level as well as complete suites of software management tools that will give them powerful capabilities as they flesh out their strategic visions. Intel has a major initiative behind its power management solution as an embedded element in other solutions. Key systems management vendors that I&O professionals should consider include:

- **Dell.** Despite having a number of point products for energy and system management, many greatly enhanced in its most recent 12th generation PowerEdge Server product release, as well as having a robust data center practice centered on high-density data centers, Dell does not have a standalone customer DCIM offering.
- **HP.** While HP does not yet have an integrated DCIM solution, its direction is clear. With its most recent Gen8 technology announcement, HP revealed a line of intelligent infrastructure technology including location-aware racks and servers, intelligent PDUs that can report and control power, and rack-level power capping. In addition, HP has a data center management and optimization solution portfolio, including a suite of workload planning tools in HP Insight Management. Through its Critical Facilities Services division, HP has consulting, design, and implementation capabilities for DCIM solutions, incorporating in-house solutions or in partnership with other vendors in the DCIM infrastructure space. While it currently has productive partnerships with multiple other vendors in the DCIM and infrastructure space, Forrester believes that HP is also working on a complete DCIM solution stack of its own.

- **IBM.** Considering its comprehensive data center business, which includes a full range of services, such as data center design, management, and construction, as well as hosting and colocation, it is not surprising that IBM has a fully functional DCIM suite. Maximo Data Center Infrastructure Management claims to provide the full suite of basic requirements and many of the advanced functions listed above. Note that it requires integration with IBM Tivoli Asset Management for IT in order to provide full functionality. Like HP, IBM's services organization provides a wide range of integration services for DCIM solutions along with a portfolio of data center operational services.
- **Intel.** While not strictly speaking a complete DCIM solution, Intel deserves mention as a key enabler for server-level power management with its Node Manager and its Data Center Manager software, both of which are licensed in multiple fashions to other vendors. Node Manager is, as the name suggests, a chassis-level power management solution, and Data Center Manager aggregates Node Manager and other power information to provide a comprehensive power and thermal management solution.

The Rich Opportunity For DCIM Will Attract More Vendors . . .

The DCIM opportunity has come into view very rapidly, with cost, resource efficiency, energy, and carbon footprint concerns interlocking with the underlying physics of large data centers increasingly coming up against the limits of power and cooling capacity. DCIM represents a major new opportunity for vendors, both for its revenue and for a way to establish control over parts of the infrastructure chain that were previously disjointed and served by competitors or adjacent market suppliers.

In addition to the current suppliers, systems vendors, many of whom currently license components from established DCIM suppliers and/or offer partial DCIM solutions, are rushing to establish a presence. Forrester has seen positioning presentations from major industry players that detail a long-term vision of an integrated utility to workload-aware DCIM management stack. Intriguingly, except for the logos, the presentations are almost identical. While amusing on the surface, this consistency is an important indicator that the problem is well understood and that the offerings are probably well-grounded in customer input as well as long-term experience in the data center.

In addition to the major systems vendors, we expect more of the hosting providers, both major and niche, to increasingly look at unbundling their tools as both a profitable offering and a way to attract customers with the value proposition of a consistent management interface as they expand capacity into a hosting environment from their own data center, a value proposition that could be attractive to enterprises provisioning hybrid cloud environments. We have already seen this from IO, and

many of its competitors have also developed their own DCIM management stacks that they may choose to bring to market.

... But This Will Ultimately Make The I&O Professional's Job Even More Complex

Competition has been a wonderful thing in the IT world, driving the industry to new heights of excellence and offering consumers of technology continually better choices. But, like many blessings, this choice comes with a cost — in this case, the requirement that I&O groups devote considerable time to tracking potential suppliers and understanding both their own requirements and the state of the emerging offerings. I&O professionals must, at a minimum, develop a set of criteria and models that incorporates:

- **Future workload forecasts.** Without a picture of future workload requirements, I&O groups are effectively flying blind when it comes to forecasting requirements. Unfortunately, all but the most sophisticated organizations do a poor job of workload forecasting, both on a technical level and on a business level. I&O groups can solve the technical problems by themselves but must work to build bridges to the business stakeholders so that they can get better visibility into future business requirements that will add workload to their data centers.
- **Technology strategy and strategic vendor road maps.** Likewise, without a strategic technology road map, I&O groups are at a disadvantage, although less so than if they do not have any coherent picture of workload forecasts. Since most DCIM solutions, especially those not from a major systems vendor, can be assumed to be vendor agnostic, they will accommodate changes in vendor alliances. The advantage to having a strategic technology plan is that advanced knowledge of vendor plans and capabilities will make overall data center plans more accurate.
- **Financial constraints and resources.** Can't afford it? Better to find out sooner rather than later what financial constraints are imposed by senior management. At the same time, proper financial modeling of proposed DCIM investments can be a strong weapon in the quest for resources — the case for a DCIM investment can be made with fairly simple ROI calculations, particularly if you have significant deficits in your preexisting asset management and/or energy management programs.⁹

RECOMMENDATIONS

DETERMINE IF AND WHEN TO INVEST IN A DCIM SOLUTION

DCIM solutions are complex and therefore difficult to implement and will represent a significant investment in time, money, and management focus, so not all I&O groups will want or need one. The following are some basic guidelines that can provide you with context when deciding whether to invest in DCIM technology:

- You have more than 50 KW of data center capacity or 20 racks of equipment.
- You are planning a new data center investment of any sort.
- You are approaching the limits of an existing facility and you want to understand how to add capacity.
- You are under pressure to increase capital utilization and/or cut energy costs.

WHAT IT MEANS

NEW DCIM SOLUTIONS WILL MAKE THE I&O JOB MORE CHALLENGING

Comprehensive DCIM solutions have really only emerged as robust commercial offerings during the past 12 months, but they have now reached a threshold where they can demonstrate both usability and strong financial justification in a macro environment that will increasingly reward operators who are energy efficient. Forrester expects an increased velocity of innovation and industry investment over the next 12 months as established vendors try and convert large shares of a near-nascent market into major revenue, and emerging challengers try to carve out a position in a product segment that will be both rapidly growing and central to data center operations, affording considerable influence to its providers.

Another finding that stands out is the increasing complexity of the I&O role in the future. As DCIM solutions are added to the milieu, the I&O professional's job will become more complex. By accepting the complexity of the new solutions, I&O professionals will be able to deliver more robust, efficient, and cost-effective data centers to the business.

SUPPLEMENTAL MATERIAL

Methodology

Forrester's Forrsights Hardware Survey, Q3 2011 was fielded to 2,343 IT executives and technology decision-makers located in Canada, France, Germany, the UK, and the United States from companies with two or more employees. This survey is part of Forrester's Forrsights for Business Technology and was fielded during July and August 2011. The LinkedIn Research Network fielded this survey online on behalf of Forrester. Survey respondent incentives include a choice of gift certificates or charitable donations. We have provided exact sample sizes in this report on a question-by-question basis.

Forrester's Forrsights for Business Technology fields 10 business-to-business technology studies in 12 countries each calendar year. For quality control, we carefully screen respondents according to job title and function. Forrester's Forrsights for Business Technology ensures that the final

survey population contains only those with significant involvement in the planning, funding, and purchasing of IT products and services. Additionally, we set quotas for company size (number of employees) and industry as a means of controlling the data distribution and establishing alignment with IT spend calculated by Forrester analysts.

We have illustrated only a portion of survey results in this document. To inquire about receiving full data results for an additional fee, please contact Forrsights@forrester.com or your Forrester account manager.

Companies Interviewed For This Document

Attend Systems

CA Technologies

nlyte Software

Panduit

Romonet

Schneider Electric

Vantage Data Centers

Cormant

Emerson Network Power

HP

IBM

Innovolt

Interxion

IO

ENDNOTES

- ¹ Forrester has been talking about the journey from IT to BT (business technology) for a number of years now — the idea that a relentless shift is happening in which the business is sourcing and managing more and more technology outside of IT's control. The shift to BT redefines operations, support, and the delivery of technology services but by no means suggests the death of corporate IT. In fact, Forrester predicts that IT will be more important than ever before in the empowered era as CIOs build agile and nimble technology organizations that can respond to these changing business needs. Forrester defines empowered BT as a technology approach where enabling technology innovation is embedded in the business while IT provides "just enough" centralized coordination and oversight for enterprisewide goals. See the July 18, 2011, "[Empowered Business Technology Defined](#)" report.
- ² Forty percent of respondents indicated that a power failure was the cause of their most significant disaster declaration or major business disruption. See the May 18, 2011, "[State Of Enterprise Disaster Recovery Preparedness, Q2 2011](#)" report.
- ³ To exploit your server efficiency and energy savings potential from virtualization, Forrester recommends

three process improvements: 1) Increase your overall virtualization footprint; 2) increase your virtual machine (VM)-to-physical host and server utilization ratios; and 3) procure servers and architectures that are more energy-efficient. See the August 26, 2010, "[Maximize Your Energy Savings From Server Virtualization With Three Process Improvements](#)" report.

- ⁴ There has always been a need for IT financial management, and until recently I&O organizations have been able to survive without mature IT financial management capabilities. The changing business and IT landscapes, however, bring an end to such a slapdash approach to managing I&O's finances and investment and ushers in the need to extend IT financial management to encapsulate the concept of value. See the October 5, 2011, "[Five Steps To Improve The IT Financial Management Maturity Of Your I&O Organization](#)" report.
- ⁵ Enterprise carbon and energy management (ECEM) systems represent a new market of dedicated solutions that allow companies to manage their sustainability strategy and are ripe to be tackled by software vendors and service providers. Forrester anticipates the ECEM market will grow at a compound annual growth rate (CAGR) of 83%, reaching \$903 million by 2013. See the December 21, 2010, "[The Evolution Of Enterprise Carbon And Energy Management Software](#)" report.
- ⁶ One of the major divisions in the world of DCIM user interface (UI) design is the debate between realistic and schematic rendering. Some very capable packages, such as the DCIM offering from IO, have very abstract symbolic displays. Our impression in watching demonstrations of these is that they are very suitable for expert users and allow very rapid navigation and considerable flexibility in displaying and formatting information. On the other side of the debate are those who provide realistic pictorial depictions of the data center as a primary interface for display and control along with some level of dashboard displays. Their proponents believe that these are more productive in that they show realistic renderings of equipment, its placement, and status. Forrester believes that while interfaces can be a great selling point for software, all of the interfaces we have seen are functional, and users should drive their decisions from the underlying functionality rather than the display.
- ⁷ All products appear to do an acceptable job of displaying and alerting thresholds for individual or aggregated data items. The difference is how flexible they are in defining, for example, a complex set of rule or patterns that relate power consumption, network traffic, and application-based software data to determine that there is a spike in load and that an extra allocation of power is necessary, and that as a result, a set of CRAC fan speeds must be changed. Based on an initial review it appears that CA Technologies has the most flexible and extensible set of rules capabilities as a result of incorporating IP and components from its other management products.
- ⁸ Currently the majority of I&O groups are not ready to accept automated changes to the environment other than existing closed loop control systems such as thermostats, but Forrester believes that over time the combination of familiarity and process maturity will result in an increased willingness to employ additional automation of the data center environment, and the DCIM platform should be ready to make this leap.
- ⁹ In some cases the exercise of justifying a DCIM investment may highlight critical process and/or organizational flaws that will need to be addressed along with the technology. For example, in many organizations the electric bill does not go to the I&O group, but rather to facilities, so I&O has either secondhand data and/or very indirect incentives to really economize on power.

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A global research and advisory firm, Forrester inspires leaders, informs better decisions, and helps the world's top companies turn the complexity of change into business advantage. Our research-based insight and objective advice enable IT professionals to lead more successfully within IT and extend their impact beyond the traditional IT organization. Tailored to your individual role, our resources allow you to focus on important business issues — margin, speed, growth — first, technology second.

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« IAN OLIVER, client persona representing Infrastructure & Operations Professionals

