DCIM: An ‘Operating System’ for the Data Center

Context: The evolution of DCIM scope

Data center infrastructure management (DCIM) is a powerful management solution with a complex provenance. Rooted in building automation, computer-based control systems for monitoring and managing mechanical and electrical services to improve security and better regulate a facilities’ energy demand, the first applications of DCIM were typically targeted at data center energy management. Through temperature sensing and heat mapping, solution providers worked to provide facilities operators with the information needed to address a critical facilities issue – increasing energy consumption and cost associated with data center cooling technologies. But DCIM has evolved over time to encompass a range of point solutions from niche players aimed at optimizing specific data center systems, including (but not limited to) power, cooling, asset lifecycle management and capacity planning, and also comprehensive suites of integrated services that extend management and control to all assets found in both facilities and IT domains.

According to Rich Ungar, North American business manager for data center automation at ABB, “there is no simple definition for DCIM as within that class of products, you see everything from tools to monitor data center infrastructure, tools to control data center infrastructure, tools to help plan workflows and visualize locations and connectivity between servers and racks and that visualize environments in which that equipment sits as well as capability to forecast utilization.” Some industry observers describe DCIM as an ‘operating system for the data center’ that optimizes operations to meet business or service-oriented goals. Today, integrated DCIM

solutions provide broad support for data center facilities staff as well as IT operations people with information needed in ongoing activities and by allowing both groups to more easily share data that formerly was siloed in IT or facilities systems.

Business issues: Cooperation the missing link in optimization efforts

The data center of today bears little resemblance to its former self. While yesterday's facility typically ran applications on a single OS, aligning these with specific physical hardware (often mainframe) in a designated computer room, the modern complex runs multiple applications in varied environments, often distributed across different locations. Data centers can now be on-premise, hosted or in the cloud, and they're getting hotter. The app and mobile explosions, cloud and virtualization technologies, and new levels of high density computing, networking speed and storage capacity are delivering on increasing expectations for business agility. The performance gains have come at a price, though – they have added layers of complexity to the IT and facilities infrastructure needed to support it. This increased complexity means that manual approaches to management and maintenance of data center infrastructure are no longer tenable – and automation of multiple tasks an increasing imperative.

For many data center operators, space and power represent key operational constraints that need to be addressed. Compute service demands continue to spiral upwards in most organizations; however, physical space to house new IT equipment and the power that can be delivered through existing distribution infrastructure is often limited. A key question for many operators is how to support ongoing growth in IT out of existing facilities capacity.

Closely related to issues of space and power is the need to better manage assets: if adding more equipment is difficult today, planning for future is an even-thornier task, made more challenging by financial and IT service delivery trends. While a classic tactic in capacity planning has been overprovisioning to ensure IT needs are met a decade out, tighter IT budgets reflect a more conservative approach on the part of many organizations to bringing more capital-intensive capacity online. In an era where public cloud providers offer compelling alternatives, at least from a financial perspective, pressure to align data center capacity with real, identifiable business computing needs is taking on added significance. Fiscal constraint is also driving need to better manage the primary OPEX issue – energy consumption, which in the typical New York-based data center accounts for close to 30 percent of operating budgets.

While increased server density, high levels of virtualization and the need to support an app hungry, mobile business community continue to put new pressure on data center environments, a primary barrier to operational improvement hails from an unlikely source – from the organization's seeming inability to coordinate the disparate agendas of IT and facilities management. With singular focus on sourcing adequate compute capacity, the IT manager typically remains blissfully unaware of facilities' need to manage power, cooling and other facilities systems – and the power bill – while the facilities manager's efforts to reduce power and cooling-related expenditures may be viewed by IT as an activity that could compromise uptime. This communications lacuna results in a lack of coordination, and in many cases, lost opportunity for data center optimization.

Technology capabilities: One size doesn't fit all

DCIM is a specialized software, sensor and hardware-based solution that can provide a single-pane-of glass view into various systems across both IT and physical infrastructure in the data center. Data collected from sensors is used to visualize and track physical assets within the facility, align IT equipment with available space and power for more rapid configuration of additional compute equipment, improve alarm systems, and remotely monitor energy consumption, power use as well as heat issues that may compromise the environmental health of the data center. Analytics engines and predictive modelling tools available in some DCIM options enable planning for future capacity needs and the development of better strategies around power management and other functions. In advanced solutions, integration with IT systems can extend control beyond the physical down to the virtual: some DCIM solutions feature the logical control capability and the ability to interface with hypervisor platforms needed to move VMs for optimal sharing of power and cooling resources.

Not all DCIM solutions are created equal; different vendor offerings feature different strengths. ABB's Decathlon, for example, provides a holistic approach to data center management by offering the gamut of DCIM capabilities – automated energy and cooling management, intelligent asset and capacity planning, remote monitoring and root-cause analysis for better alarm management – in modular form to suit different customer needs, which may also vary from site to site. As Ungar explained, "it's not one size fits all; it's an environment in which you pick the functionality that is important for you, and not what's not." Decathlon features a unified, open platform that supports centralized management and reporting of data from different facilities' systems, onto which ABB tools/dashboards and an array of third-party proprietary software solutions targeted at different data center constituencies are integrated.

The Decathlon solution is built on ABB's long experience in industrial control systems, and incorporates redundancy and quality standards from this legacy to deliver a robust, reliable product that can support mission critical applications. It also draws from ABB's expertise in the energy industry, and in Decathlon the company has managed to address the intersection of data center and utility provider needs: while the solution allows users to predict future energy needs, it also

allows for analysis of real time pricing to support demand-response load shifting in the data center, and execution of energy trades to take advantage of dynamic pricing.

Implementation challenges: Planning is key in staged adoption

The breadth of DCIM solutions and the range of problems the technology can solve are impressive, but the plethora of vendor offerings (more than 80 commercially-available solutions) can also produce confusion for the potential user. In general, solutions with the broadest scope and scale offer best potential to optimize operations and more easily evolve use of DCIM capabilities, however, organizations should assess existing systems to best connect their particular needs and budget with DCIM capabilities. Full blown DCIM can be an expensive proposition.

As it is rare for the facilities team to introduce all DCIM capabilities at once, strategy and planning around an adoption path that takes into account business objectives and that can demonstrate 'quick wins' at different stages to maintain executive and stakeholder support is key. This process should involve conversation between IT and facilities staff since strategy definition involves both technology implementation and analysis of workflows and Information Technology Infrastructure Library (ITIL) processes: successful DCIM implementation encompasses technical, people, and process integration.

The ideal adoption curve entails gathering of information from different systems according to IP protocols, the normalization and central storage of data, analytics and modelling, reporting to different operational groups, and the ultimately control of assets and equipment through automated processes built on intelligence generated by the DCIM system. As with any 'ideal' situation, practice varies according to individual circumstances. It may be easier, for example, to implement DCIM in a greenfield opportunity where DCIM can replace traditional, less comprehensive monitoring solutions that would be installed anyways than in brownfield facilities in which different equipment and management systems running on different industrial or communications protocols that have been layered on over time – resulting in legacy investments and practices that impact the evaluation of new systems.

Benefits: Facilities management to build competitive advantage

With DCIM, users can optimize power, cooling and space in the data center to defer capital investment in new build, and solution tools identify hardware and software assets to allow advanced modeling to determine their optimal location and configuration. Visibility into both IT and facilities systems allows operators to ensure there is enough power for additional IT capacity, a key hurdle in many data center expansions. DCIM can also reduce complexity introduced by cloud and virtualization technologies through better alignment of compute demand and resource supply: by integrating with IT service management, DCIM can automate the provisioning of IT racks with power and cooling in the infrastructure layer. And through physical asset monitoring and control, DCIM can deliver significant energy savings, enough for a three year ROI according to Gartner.

Advanced DCIM capabilities hold express promise for specific segments. Energy monitoring and billing features in some solutions, for example, enable energy chargebacks either to divisions/departments within an organization or to organizations such as the service provider that may be looking to differentiate colocation services by offering customers the tools for fine-grained energy management and pricing. The classic enterprise organization, which is likely be experiencing cost pressures, is also likely to be operating a number of facilities using discrete monitoring solutions that do not necessarily provide a unified view into the entire data center portfolio. The DCIM value proposition for this group is better visibility, better management functionality and reduced maintenance costs. For the rapidly growing colo provider that is essentially concerned with opening new capacity, DCIM visibility can speed the construction and commissioning process, providing a consolidated view of assets from launch date.

But by enabling an integrated, 'single pane of glass' view of formerly disparate domains – building management systems, power distribution, and security and cooling on the facilities side, and service management, application and workload support/maintenance, transaction and QoS systems on the IT side – that is accessible to both IT and facilities, DCIM offers a common platform for developing control of enterprise systems serving both groups. Full exploitation of DCIM as a unifying tool may ultimately allow for the proactive address of larger-picture issues such as automated server/storage provisioning, energy chargeback, carbon allocation, and when to build new data centers to drive further competitive advantage for adopters.

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