

White paper

Control room convergence: Merging industrial monitoring and control systems with data center operations

Data centers as an industry

Projected increase
2011 - 2012:

Number of data
center facilities: 7%

Number of server
racks: 15%

Energy consumption: 19%

Datacenter Dynamics Global
Industry Census 2011

Few industrial sectors have grown as rapidly as the data center business. From mere “computer rooms” 20 years ago, data centers have become sophisticated, highly specialized, standalone installations. This growth is driven by society’s seemingly inexhaustible desire to produce data and has led to data centers becoming major consumers of power. New, showcase data centers are highly engineered and designed to be energy efficient, but for every one of these there are hundreds of average data centers that face challenges, sometimes across multiple sites. Often, the tools being used to manage these facilities are not up to the demands being placed on them. There is a universally recognized need for a unified monitoring and management system for data centers. Decathlon® for data center infrastructure management, is such a system.

Evolution of the data center

In the early days of the Internet, data centers had little or no unified monitoring capability. There was no way to know how much energy was being used by the facility, much less by a given piece of equipment. Server utilization rates were equally unknown. In fact, there was no pressing need to know, energy was cheap and capacity was not an issue.

The surge in IT and the growth of the Web has caused an exponential rise in data storage and a similar rise in energy consumption: Just five years ago, typical servers drew around 2.5 kW per rack, but today, servers consume between 8 kW and 30 kW per rack, posing a huge cooling challenge.

In response, many data centers have implemented hot aisle/cold aisle schemes, for example. These manage air flow to avoid hot and cold air mixing.

However, this type of solution is passive. When it comes to active monitoring and control, the systems in place today are often inadequate. Point solutions are available, for example to manage server virtualization or monitor energy use on a facility-wide basis, but, importantly, these systems are not integrated, thus adding complexity and introducing information gaps.

In other areas, data centers still lag other industries by a wide margin. Asset management, for example, is generally understood to mean the systematic monitoring of equipment status and performance in order to better manage maintenance and optimize the operations and maintenance budget across the entire equipment fleet. In the data center world, asset management has historically meant only keeping track of the purchase date and physical location of equipment.

ABB estimates that only 5 to 10 percent of data centers have monitoring and control systems in place for server operations, energy consumption and environmental control. Another 20 to 40 percent have some monitoring and control capability—usually around server operations—and the remaining 40 to 65 percent have little or none. This is because many older facilities were treated as just another commercial office space, albeit with some unusual electricity requirements, and had to make do with the already-installed conventional building management systems to control temperature and humidity.

Enter data center infrastructure management

There is, then, a need for a unified monitoring and management system for data centers. It should have a single user interface that reduces the complexity of burgeoning point solution interfaces. It should also manage server operations as well as cooling, environmental controls and energy use. The good news is that process industries have already tackled many of the same issues, so the data center industry is in a position to leverage those mission-critical systems in building its own. This field of technology development has been labeled data center infrastructure management (DCIM).

From a strategic standpoint, DCIM aligns the data center with business goals through:

- energy and performance information
- operational decisions supporting business initiatives
- delivery of new apps and web services

The growth in the size, number and sophistication of data centers over the past two decades has been staggering and there is now a robust industry dedicated to serving this sector.



Decathlon for DCIM: Power, cooling and space dashboard

DCIM characteristics

Several characteristics are essential in a DCIM system. Uptime is the most critical parameter for the data center industry, so DCIM systems must be highly reliable. DCIM systems must also offer asset management capabilities that go well beyond simply keeping track of servers: Condition-based maintenance and diagnostic tools (e.g., to identify servers running in a loop) will bring asset management in the industry into line with other equipment-intensive businesses. As more and more operators manage multiple data centers, computer rooms and server closets, multisite visibility becomes another must-have in a DCIM system.

Ultimately, DCIM provides the visibility, decision support and control technologies to better manage data center operations, enterprise-wide, through a unified view that spans mechanical, electrical and IT systems.

What is DCIM?

DCIM systems promise to deliver actionable information to data center operators so they can maximize capacity, optimize their operations and reduce cost and risk. ABB Decathlon, ABB's DCIM solution, takes up this challenge and offers a significant improvement over the status quo:

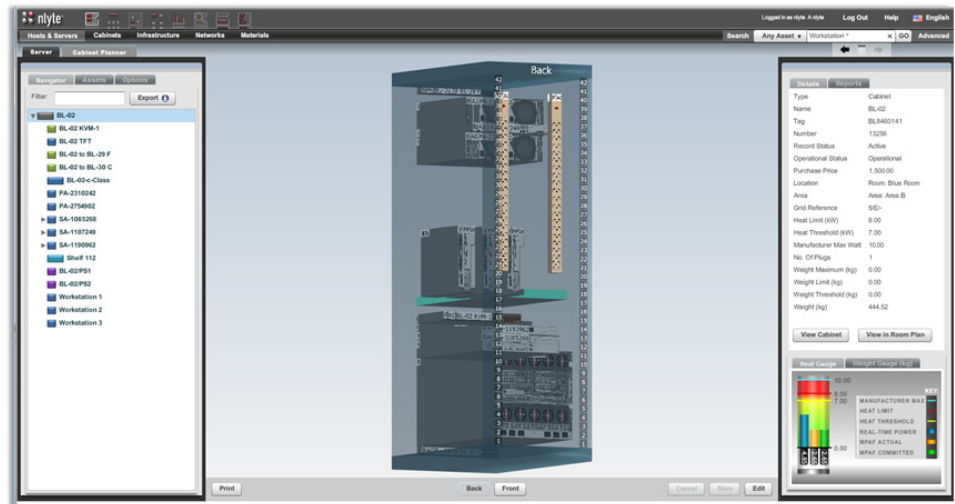
Facility management

Monitoring and control over facility systems, such as air conditioning, air handling and mechanical and electrical equipment.

Maintenance management

Shifting from time-based to condition-based maintenance using automated prognostics and diagnostics to identify and resolve issues before they become problems.

DCIM systems must be highly reliable and also offer asset management capabilities that go well beyond simply keeping track of servers.



Decathlon for DCIM: Rack information dashboard

Power management

Monitoring and control of devices, power systems and meters, including the substation, microgrid and on-site power generation, to ensure safe and reliable power distribution and consumption.

Resource forecasting and energy planning

Solutions from ABB and third parties provide additional value by optimizing the energy value chain and allowing participation in energy markets. For example, planning and scheduling tools to optimize energy usage and supply and energy balance management tools to help get the best price from energy markets are enabled for the data center through Decathlon for Data Centers.

Energy management

Combining real-time energy consumption data with energy contract information, real-time pricing and demand response for energy cost optimization

Asset and capacity planning

Nlyte Software's DCIM suite has been embedded in Decathlon. It can optimize space, power and cooling capacity through intelligent placement of IT assets. It also models what-if scenarios and automates and manages workflow processes.

Troubleshooting

Root-cause analysis and alarm management provides granular performance detail for the entire data center operation.

Control and automation

Enabling facility and IT performance optimization at a device and system level.

Remote monitoring

Real-time monitoring of all assets and environmental conditions.

The case for DCIM

The need for visibility, decision support and control technologies for rapid response in data centers is clear. DCIM offers a solution to the patchwork of point solutions that many facilities rely on today. DCIM is still new, but a few over-arching concepts have emerged that are likely to guide the development of these systems:

Visibility and better control

The essence of the DCIM business case is to establish a realistic baseline of data center energy use through real-time monitoring, so operators know when, where and at what rate energy is being consumed. With that information, they can then take tactical measures to optimize resources and forecast energy requirements.

Resource consolidation

DCIM systems leverage increased visibility along with powerful analytics to consolidate resources and eliminate waste, maximizing existing capacity. This leads to hardware savings, data center savings (e.g., cooling and space) and reduced environmental impact.

Performance optimization

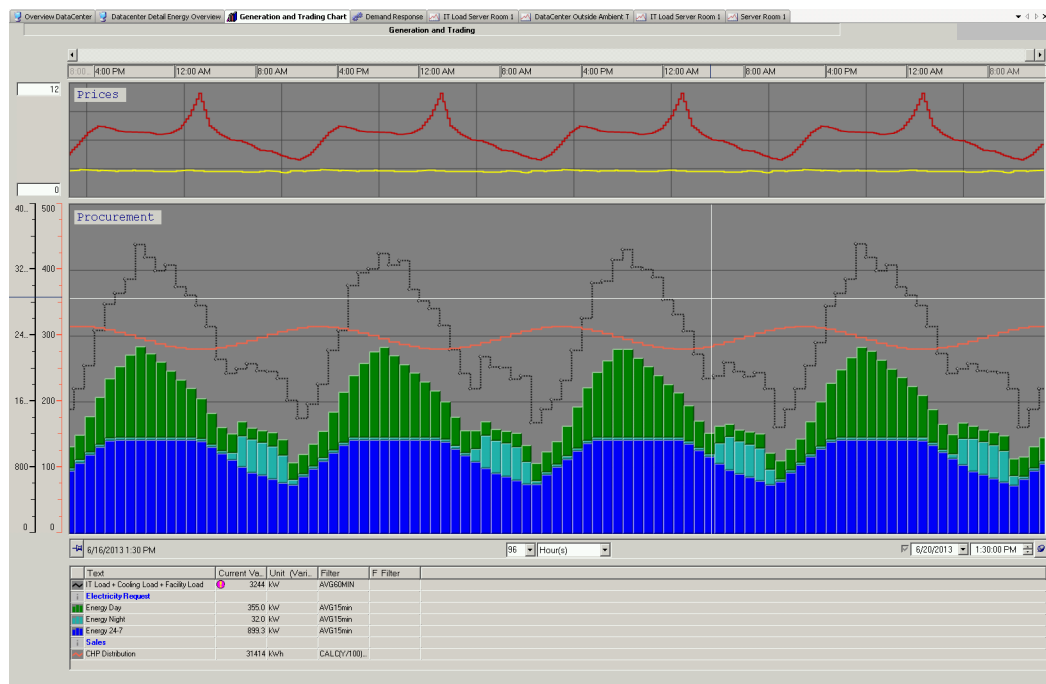
DCIM uncovers the true state of data center operations with better visibility and control to improve availability; maximize capacity of power, cooling and space and streamline operations.

Facility and IT automation

DCIM systems can assist with tasks like load shifting and temperature and humidity control, as well as tracking other parameters, such as vibration in HVAC units, so as to preempt failures.

The essence of the DCIM business case is to establish a realistic baseline of data center energy use through real-time monitoring.

The future of DCIM



Decathlon for DCIM: Energy management dashboard

What comes next?

For the vast majority of facilities that do not enjoy the advantages of cutting-edge systems and design, a step-wise approach to improving data center operations is advisable.

A site evaluation is a good first step, it reveals where immediate gains can be made. The eventual introduction of a DCIM system is made easier if the operators know what they want from it.

Retrofits should begin with simple initiatives with quick payback (ie, less than one year). These might include increasing room temperature or installing variable speed fans in the cooling system.

One example of where DCIM is headed lies in the potential for data centers to shift workload from one location to another to exploit differences in energy prices. This instant shifting of “production” is something of which “old economy” businesses can only dream. Ideas such as these will play a central role in such products realizing their full potential.

Data centers will instantly shift “production” from one location to another to exploit differences in energy prices.

Contact us

For more information, please visit www.abb.com/decaathlon-datacenters to contact your local ABB Decathlon representative.

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Reference

[1] Datacenter Dynamics Inc (2012, July).
Datacenter Dynamics Global Industry Census
2012 [Online]. Available:

<http://www.datacenterdynamics.com/focus/archive/2012/07/datacenterdynamics-industry-census-data-center-industry-robust>