

Data Center Infrastructure Management (DCIM)

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Abstract: The following white paper is part of a quarterly series developed by Willdan Energy Solutions. The intent of the series is to provide the intelligence we have collected through implementation of data center energy efficiency programs nationally. We seek to identify technologies and strategies that can become actionable items in utility-run data center programs. This quarter's white paper focuses on Data Center Infrastructure Management (DCIM). This developing technology encompasses a broad category of products and services created to integrate information from IT, power, and cooling systems in ways that enable improved the operation of the facility. DCIM emphasizes access to data, analysis of data, and the extracting of actionable items from data. It is intended to fill in the gaps between the different systems in the facility and address the challenge of using data from all systems to increase overall performance. This technology has great potential to spot energy efficiency opportunities and to enable continuous improvement.



Sample Screenshot from Geist Environet System



451 Research (a sister company of Uptime Institute) defines DCIM this way:

“A data center infrastructure management (DCIM) system collects and manages information about a datacenter’s assets, resource use and operational status. This information is then distributed, integrated, analyzed and applied in ways that help managers meet business and service-oriented goals and optimize their datacenter’s performance.”¹

Over the last several years, the data center industry has begun to recognize that the system specific tools of HVAC controls, power distribution controls, and asset management platforms, while still necessary, do not provide the data-driven, holistic view of the data center environment needed to maximize total performance. A holistic view of performance looks at IT utilization, energy efficiency, power and cooling capacity, space utilization, load balancing, energy costs, environment, and the ways all of these things impact one another.

451 Research identifies the following core benefits of DCIM¹:

- Adapt to change more easily
- Reduce waste, unnecessary over-provisioning
- Plan investments, new data center capacity
- Reduce risk of datacenter downtime
- Optimize energy consumption

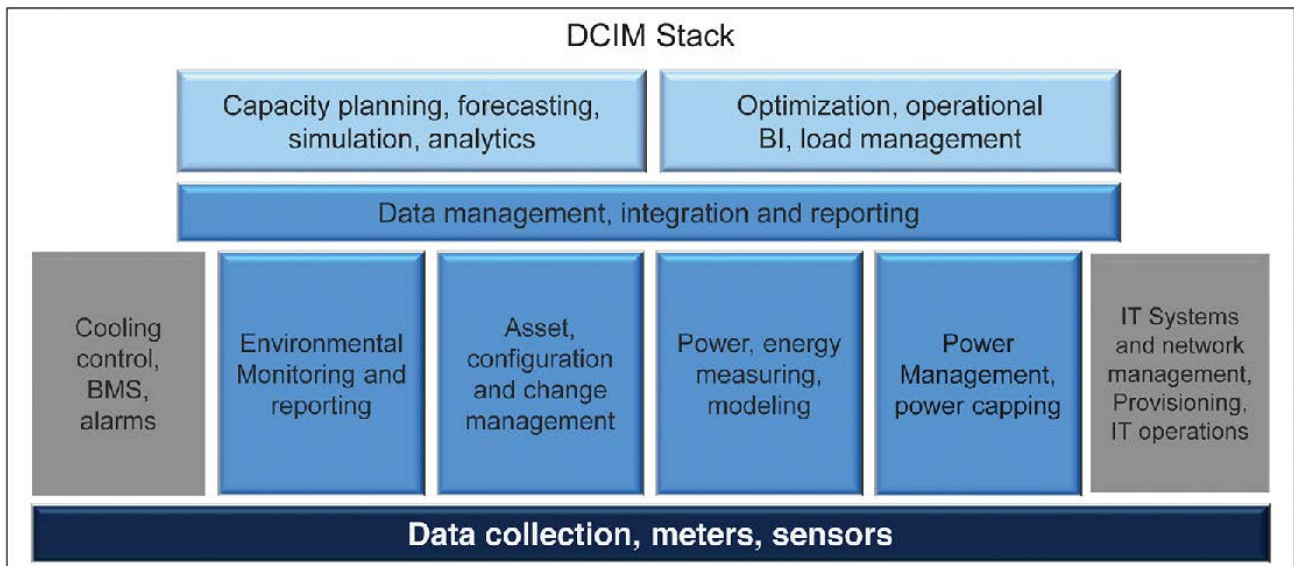
Data center managers have seen massive increases in complexity due to growth, virtualization, load density, equipment innovations, and reliability needs. It is increasingly difficult to effectively manage today’s complexity without improved intelligence through data and analysis.

Current DCIM offerings vary widely in capability and focus. Often, DCIM offerings from established vendors reflect the vendor’s heritage (e.g. emphasis on HVAC controls or IT Asset Tracking) and are based on proprietary hardware and platforms. Many start-ups have taken a more open, software based approach. However, there is uncertainty with which firms will catch on or be acquired. As such, data center managers must be cautious and thorough in evaluating potential DCIM systems.

Some companies have opted to create their own custom DCIM platforms. For example, in 2013, Digital Realty rolled out a massive custom DCIM platform it calls EnVision to collect, aggregate, analyze, and report operations data

for its 24 million square feet of mission critical space across the globe. In an article published in the Uptime Institute Journal, Digital Realty Sr. VP of Portfolio Operations David Schirmacher wrote “If Digital Realty could collect all the operational data from every data center in its entire portfolio and analyze it properly, the company would have access to a tremendous amount of information that it could use to improve operations across its portfolio. And that is exactly what we have set out to do by rolling out what may be the largest-ever data center infrastructure management (DCIM) project.”²

DCIM has huge potential to drive energy savings. For example, Barclays won the Uptime Institute 2014 Server Roundup completion for removing 9,124 physical servers globally. Barclays used DCIM as a critical tool in their effort to reduce servers through decommissioning, consolidation, and virtualization.³



Digital Realty’s Conception of DCIM Platform Organization²

Utility Energy Efficiency Program Impacts

DCIM is not typically considered a standalone energy conservation measure (ECM) in utility programs because in many respects it does not directly cause energy savings, but rather it enables other activities that cause energy savings (e.g. finding and decommissioning unused servers). However, there are ways in which DCIM can drive deeper energy savings outside of ECMs already covered in most data center efficiency programs. For example, DCIM could provide the basis for a continuous efficiency improvement program or a data center oriented, monitoring-based commissioning program.

DCIM incentives could help utilities reach under-served customers such as data centers that are already efficient but always making incremental improvements. These customers may be large and relatively efficient facilities that still have great savings potential but aren't

motivated to participate in utility programs since their gains don't come from large, onetime capital projects. A DCIM incentive offering from the utility could be used to target deeper savings in these facilities. The DCIM incentive could be an extension of programs that incentive capital measures for data centers or an additional complement to existing commercial commissioning or continuous improvement programs.

To help operators overcome reluctance to implement DCIM due to the cost, complexity, and unfamiliarity involved, utilities may wish to promote or incentivize DCIM projects as a market transformation opportunity. This could be a onetime payment or couple a first cost incentive with an ongoing partnership which pays incentives as savings are achieved and verified. DCIM technology offers many opportunities for utilities to strengthen their data center efficiency programs and drive additional energy savings.

Table 1: Example DCIM Capabilities and Applications

Capability (General)	Example (Specific)
Respond to changes in real time	When loads changes quickly, increase fan speed to mitigate hotspots before an issue arises
Mitigate risk associated with IT changes	With virtualized data centers, ensure capacity is available and even simulate any interactive effects before migrating virtual servers
Identify and reduce waste	Locate and power down unutilized assets such as servers and cooling units.
Enable faster and smoother growth	Provide forecasts of when power and cooling capacity will be exhausted for different growth scenarios
Optimize equipment layout for improved efficiency	Identify the best location for a new group of servers in regards to cooling efficiency
Allow for improved efficiency evaluation and metrics	Track kWh at the equipment level to determine one chiller has a significantly lower efficiency than the rest
Remote monitoring	Secure browser based access to live performance data

Sources:

1. *Ascierto, Rhonda, and Lawrence, Andy. "The DCIM Marketplace: Suppliers, Products and Ecosystems" 451research.com. Web. 15 Jul. 2015.*
2. *Schirmacher, David. "Digital Realty Deploys Comprehensive DCIM Solution" journal.uptimeinstitute.com. Web. 15 Jul. 2015.*
3. *Booth, Nick. "Barclays Saves \$6M by Weeding Out Dead Servers" datacenterdynamics.com. Web. 20 Jul. 2015.*