Optimize your Critical Infrastructure

White Paper

The Emergence of Integrated Data Center Management (IDCM)

Nlyte Software
1150 Roberts Blvd,
Kennesaw, GA 30144
United States
nlyte.com

A Carrier Company

Nlyte® Software

The Emergence of Integrated Data Center Management (IDCM)

Faced with greater challenges than ever before, critical infrastructure begins with integrating more tightly with data center resources

As the backbone of today's digital economy, data centers have never been more vital or central to business operations, yet they need to be even more efficient and resilient. Simultaneously, data center deployment models are changing, creating more and more complexity, which in turn presents a mandate for data centers to remain highly flexible. Now data centers critical infrastructure face new risks as a result of reduced staffing, reduced scheduled maintenance, revenue losses, and other challenges. Meeting goals in an environment with new and unforeseen challenges is best achieved by tightly integrating critical infrastructure (power, cooling, monitoring, physical security, fire detection & suppression, etc.) with IT equipment and applications.

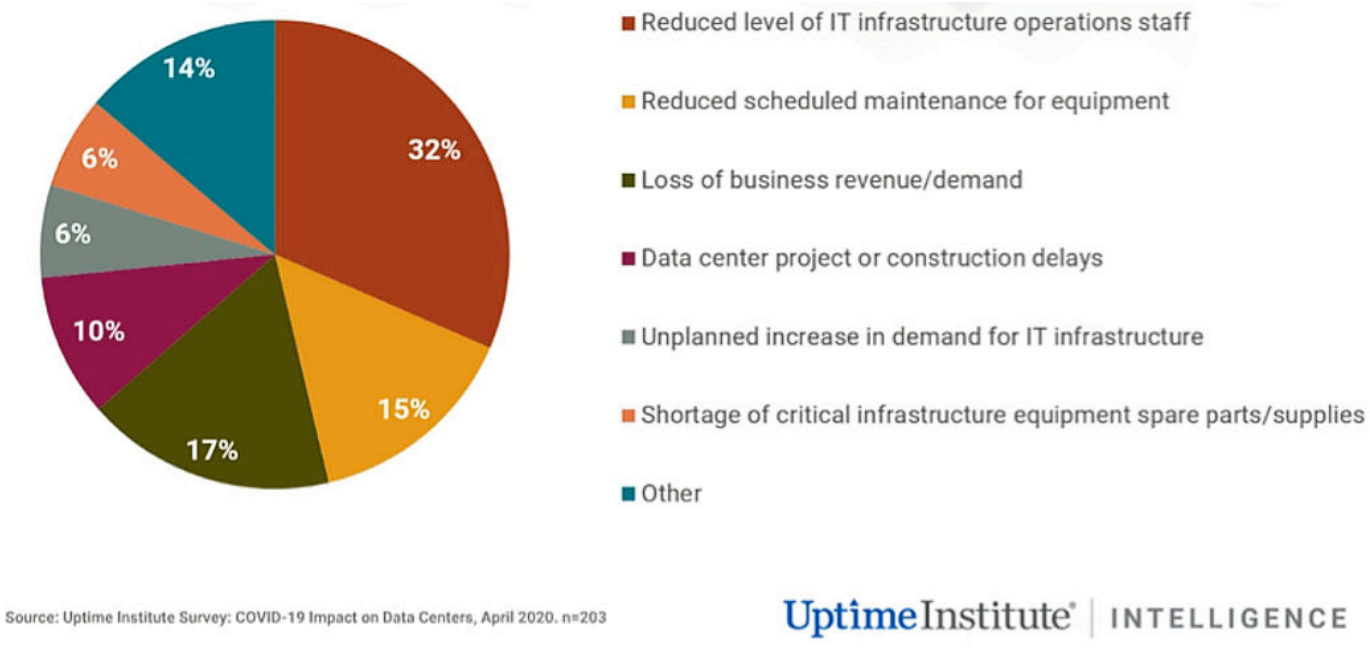
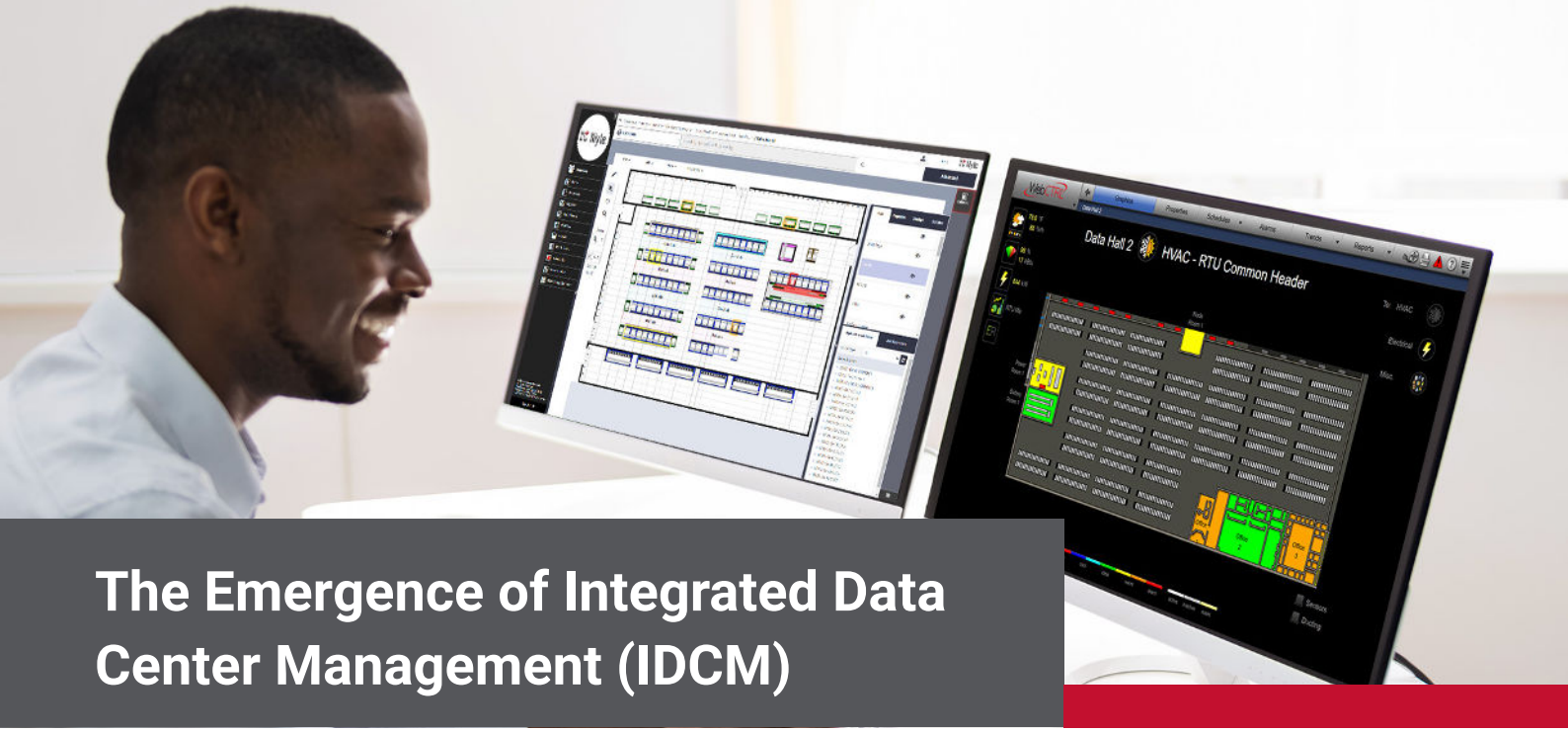


FIGURE 1: Risks to data center operations due to COVID-19 according to a survey conducted by Uptime Institute

The Emergence of Integrated Data Center Management (IDCM)

For years, data center operators have looked for the best solution for the ever-evolving problem of gaining and maintaining end-to-end visibility of IT and OT in their data center. These operators most common request is for a 'single pane of glass' shared by all audiences. This consolidated view would expose information about every part of the operation, including the facility and the data center's IT operations. This single pane of glass has proven more elusive than anyone might have imagined. As it turns out, the single pane of glass analogy has challenges in practice. Different skillsets, job functions, and daily needs make the development and maintenance of a single tool that solves all problems a veritable impossibility. Each system for monitoring critical infrastructure or IT equipment and applications has distinct features making it applicable to one audience, but not to all. In turn, vendors have focused their resources on providing solutions for a discreet problem set, be it building management systems (BMS), building automation systems (BAS), data center infrastructure management (DCIM), network performance monitors, workflow engines, etc. This specialization creates excellent solutions to specific problems but leaves the 'single pane of glass' still to be desired.

Perhaps rather than a single pane of glass, an analogy that represents a better solution for data center operators is a pair of eyeglasses with interchangeable lenses. In this analogy, the frame is common to all operators, regardless of focus. The frame comprises components like the underlying system architecture, data ingestion, data storage, and analytics capabilities. On the other hand, the lenses are interfaces that provide an expected view or result to various and disparate operators. For example, an intelligent chiller provides information to any system that can ingest the data it sends out (frame), from BAS to DCIM systems. However, the operators of those different systems have different needs for how they view and use the data – they need different lenses. Collectively the eyeglass frame and set of lenses offer a real Integrated Data Center Management (IDCM) solution. IDCM's consolidated data set is critical as data center operators cannot achieve their management and operational goals when limited by their traditional tools and processes.



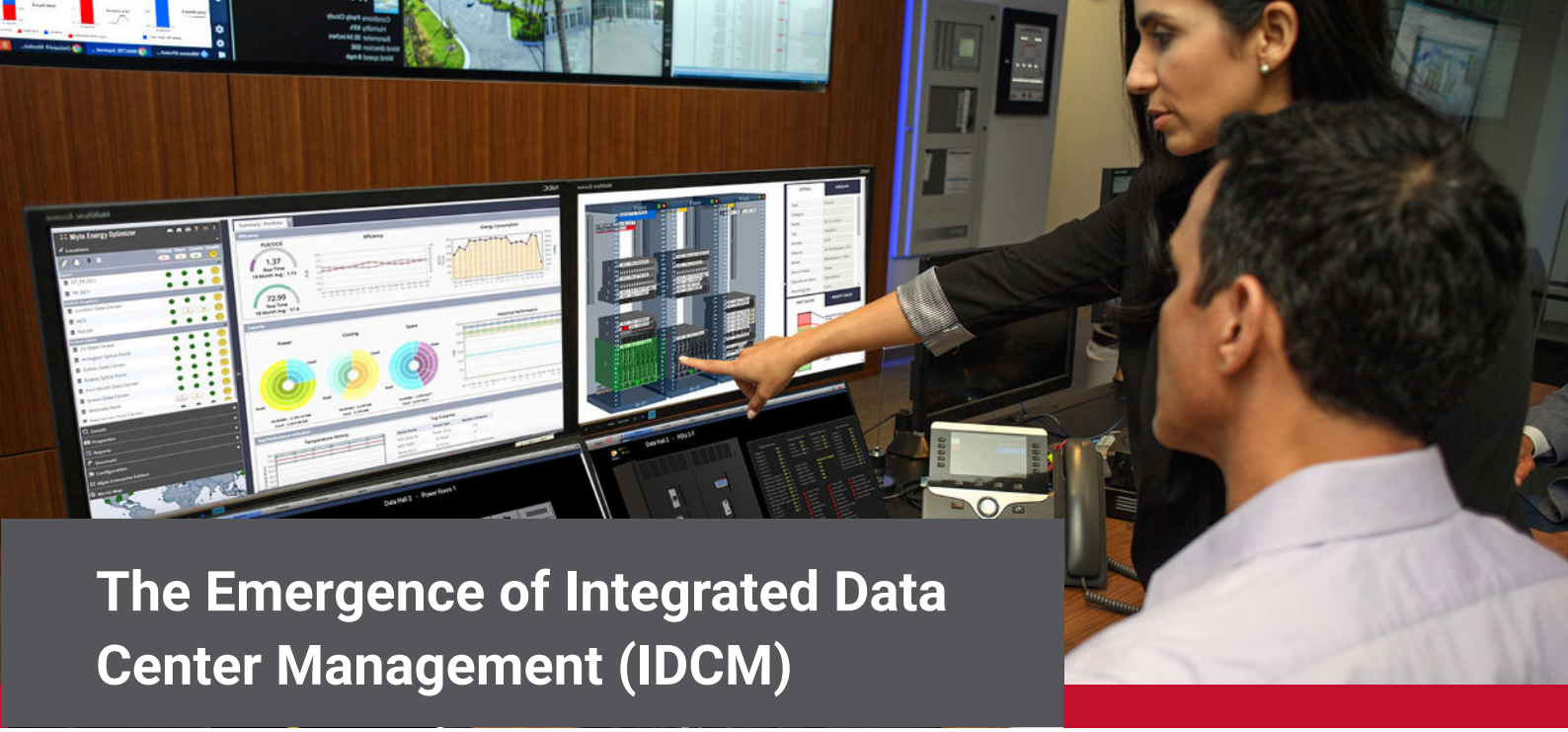
The Emergence of Integrated Data Center Management (IDCM)

Why Now?

Data centers are more challenged than ever before to find operational efficiencies and provide uninterrupted availability of critical business applications while remaining flexible. This challenge drives the need for an advanced management solution that considers the infrastructure within the data center building and the critical elements and systems within it. Operators inside the data center have different jobs and responsibilities, each with a toolset that meets their needs. However, these tools are not always integrated so they cannot present a thorough, end-to-end picture demonstrating one element's impacts on the rest of the operating environment.

Ensuring that business-critical workloads are not impacted when critical infrastructure anomalies occur is of the utmost importance to those running data centers. Essential applications and their associated workloads can experience outages from physical security issues, poor visibility into the data center's operating state, and various other reasons. The challenges faced by today's data center operators demonstrate the need for a truly integrated data center management solution. The tools to help serve respective audiences in the data center historically are useful but myopic. To get to the next level of better capacity management, reduced costs and energy efficiency, and improved uptime, data center operators must now consider an integrated approach to data center management an absolute 'must have'. IDCM can no longer be considered a 'nice to have' when those charged with improving their data center operations evaluate which moves to make to achieve necessary improvements.

With advances in computing technology such as virtualization, liquid cooling, SSDs, and hyperconverged, over the past several years, integrated data center management is the natural evolution of solutions targeted at providing data center operators and executives with end-to-end visibility



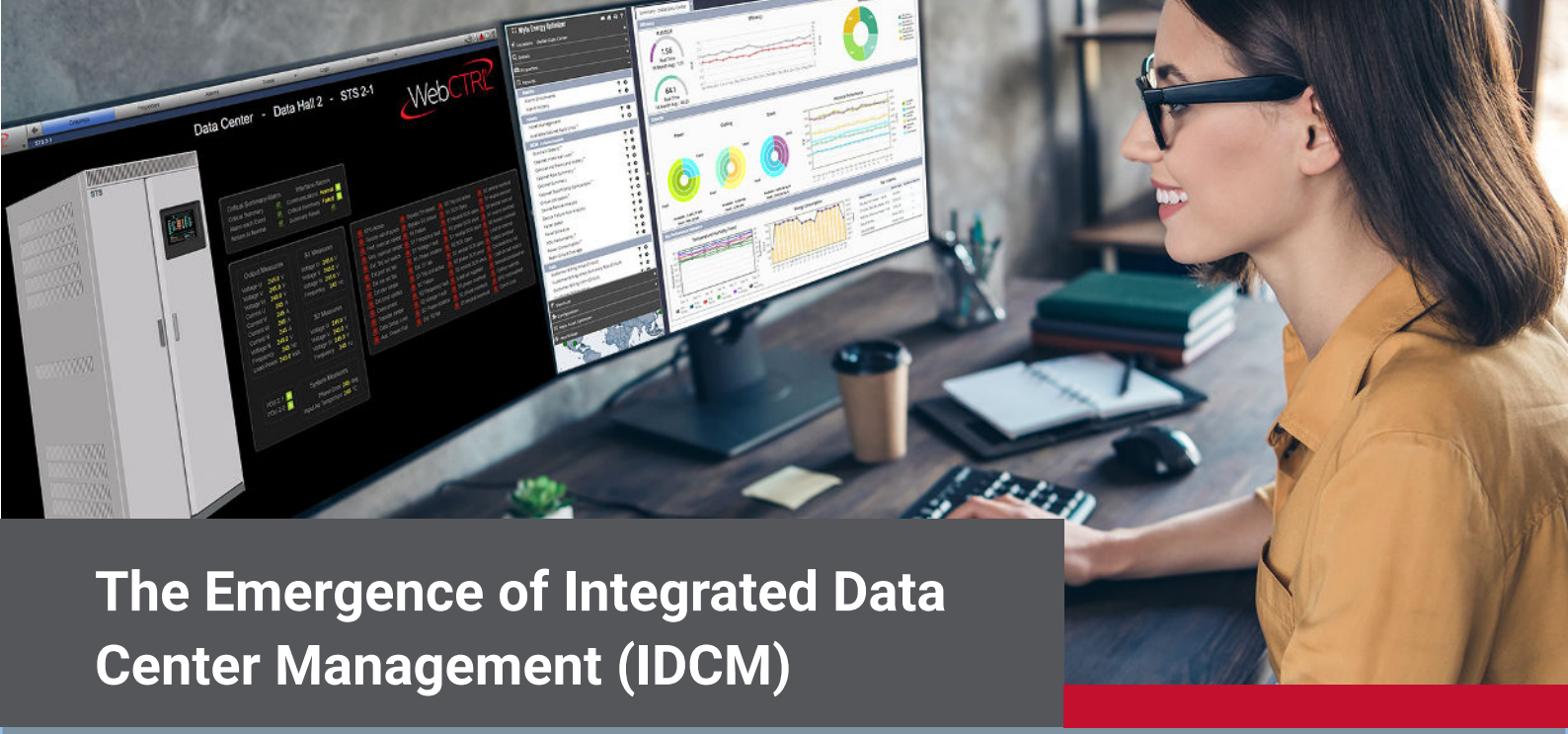
The Emergence of Integrated Data Center Management (IDCM)

into the operations of their data centers. By combining the details of building automation (security, power, fire systems, lighting, etc.) with insight provided by data center infrastructure management (asset management, comprehensive capacity analytics, health of critical power and thermal infrastructure, and virtual IT loads) IDCM offers optimal placement of workloads, better capacity management, end-to-end visibility, reduced costs and improved uptime.

Smart data centers require integrated data center management

When it comes to the smartest in the ‘smart building’ collective, data centers are located at the top. Data centers are unique buildings in that they are already instrumented to provide vast amounts of data that keeps data center operators apprised of the health and operational status of the facility’s ecosystem. However, with thousands of intelligent communicating devices communicating telemetry data simultaneously, all this instrumentation cannot provide a full picture of the data center’s health just by being in place. A complete picture requires a proper software layer that can aggregate the entire computing fabric turning those thousands of data points into meaningful information. Integrated Data Center Management delivers that software solution to improve data center operations.

To serve users by providing full-time application availability, the various and disparate systems that comprise the data center ecosystem must work in perfect harmony. A single weak element in the ecosystem can create pandemonium and unplanned downtime, costing businesses millions of dollars in just minutes.Understanding the downstream impact of an individual chiller, all the way down to a physical server and the workloads and virtual machines it houses is a real need. Integrated Data Center Management is the solution that brings clarity and understanding to this scenario.



The Emergence of Integrated Data Center Management (IDCM)

As a practical example: a chiller is a critical piece of the cooling chain in a data center ensuring proper operating temperatures for IT gear. A chiller provides a beacon, constantly sending out large amounts of data about how it is performing and potential alarm conditions. As with so many intelligent communicating pieces of equipment across the critical infrastructure, much of the data is often ignored being considered superfluous to the actual needs of an operator. With all of the various communicating devices and the cacophony of data they produce, the output is just noise to human operators and incomprehensible to sort through it in any meaningful way.

This cacophonous incomprehensible data set, however, is perfect for artificial intelligence and machine learning. In the AI/ML framework each data point can actually be assessed to help predict operating state, failures, and even prescribe recommended improvements. The future state of the data center is reliant on artificial intelligence and ensuring proper instrumentation and inter-machine communication is in place.

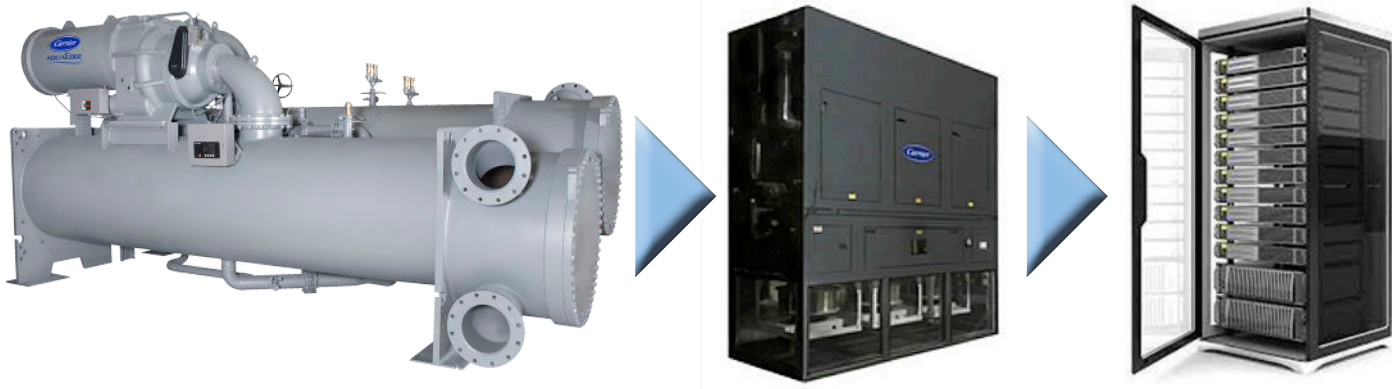
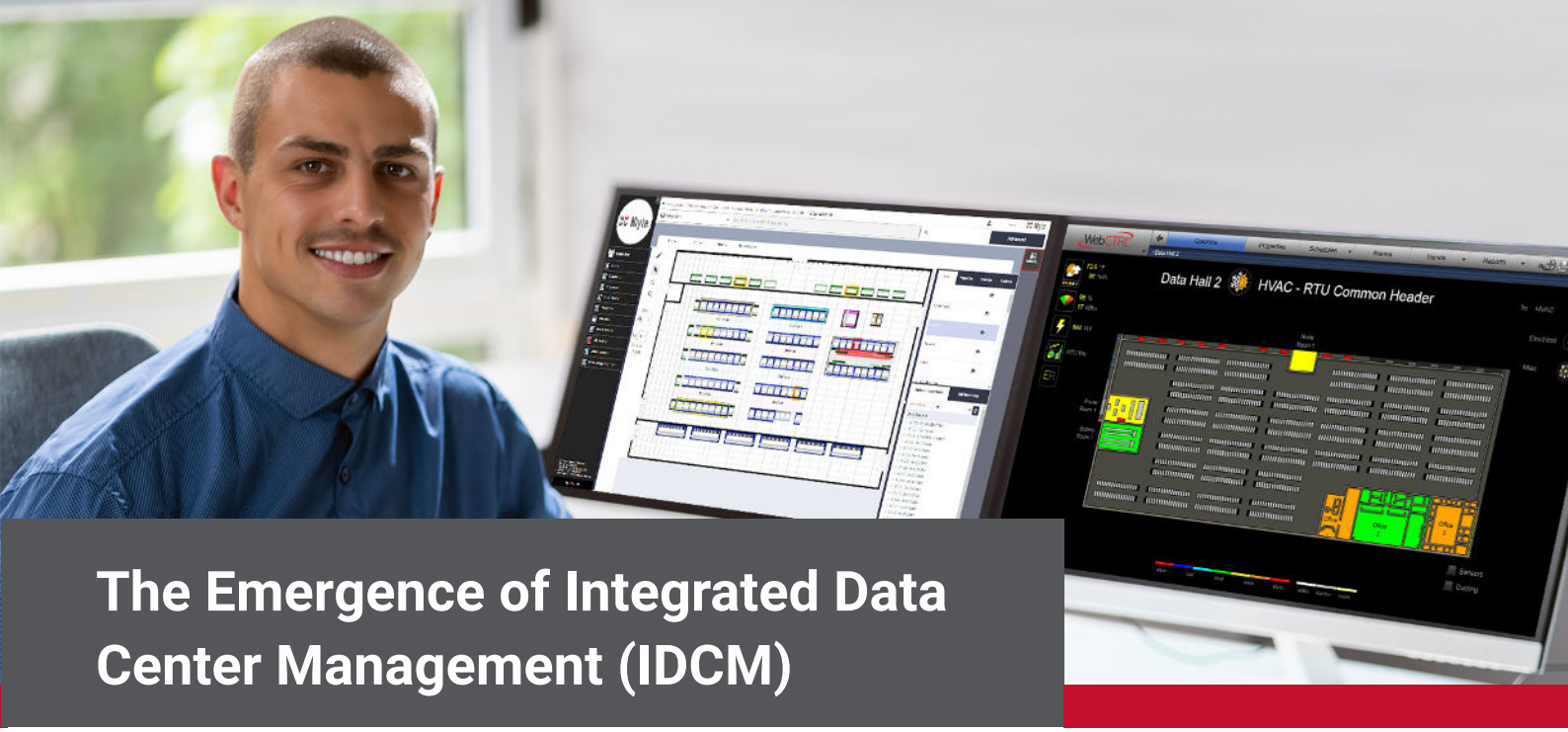


FIGURE 2: IDCM introduces the idea of a cooling chain, providing data center operators with in-depth knowledge of the impact a chiller has on downstream air handlers, racks, servers, and ultimately workloads being run on servers.



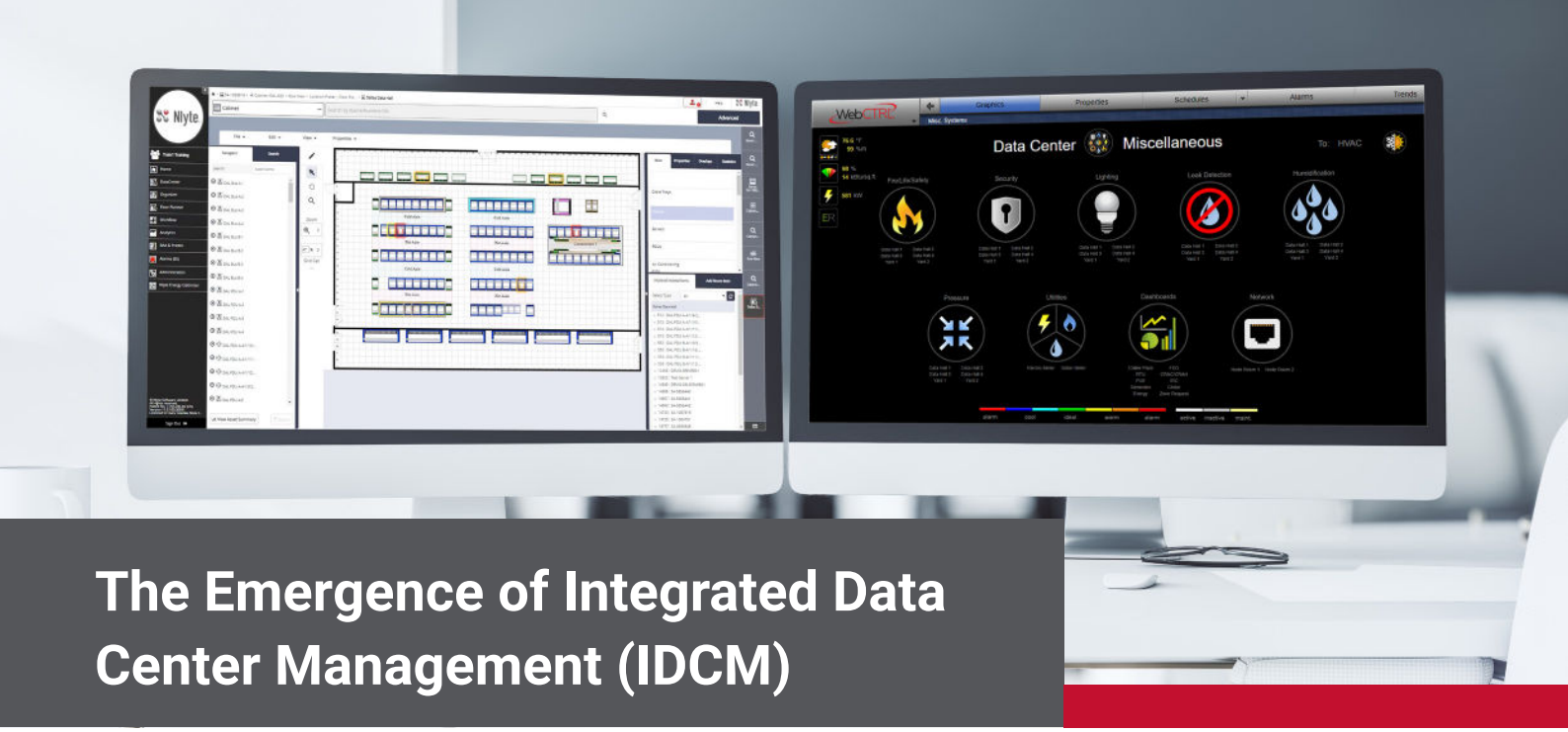
The Emergence of Integrated Data Center Management (IDCM)

Industry leaders with an understanding of data centers' complex nature and years of experience in building management and automation are coming to the forefront when an organization recognizes the need for integrated data center management. IDCM solution providers who have expertise with IT asset management, critical power, and thermal management and how that ecosystem affects application workloads are logical choices to provide lasting solutions. As leaders in the data center market, Carrier's Automated Logic and Nlyte Software understand the complexities faced by data center operators as well as the complexities within the environment itself. To help data centers achieve their operational goals, Automated Logic and Nlyte are partnering to bring Integrated Data Center Management to market and take data centers to an improved level of efficiency, availability, and flexibility.

Benefits of Integrated Data Center Management

Whether you are in charge of Critical Facilities, IT Operations, or Systems Engineering, IDCM addresses many challenges you are facing today.

Better Capacity Management – A building automation system (BAS) provides no visibility inside the rack to know where there is available contiguous space, power, or cooling for equipment placement. On the other hand, DCIM solutions have limited visibility into systems that compromise the data center's critical infrastructure, such as fire detection and suppression, lighting, physical security systems, and other critical building systems that a BAS will provide. IDCM brings together all the relevant data necessary to provide full visibility into space, power, and thermal capacity management, which helps to ensure that the workloads running in the data center are optimally placed.



The Emergence of Integrated Data Center Management (IDCM)

Reduced costs and improved energy utilization – For example, the data center's thermal equipment is heavy a consumer of electricity. It is therefore frequently a primary target for recovering costs and improving energy utilization. However, it is no simple task to change temperature setpoints without end-to-end visibility into how that temperature change will affect the equipment that is processing critical workloads. To safely change thermal equipment's energy consumption, an operator must have a granular level of transparency into how any proposed change in temperature will affect the environment and the applications being run within it. IDCM provides operators the information required to optimize the energy usage of the data center's thermal equipment.

FIGURE 3: Nlyte Energy Optimizer Dashboard

The IDCM solution processes vast amounts of data points from critical infrastructure and IT equipment to proactively provide information to make data-informed time-sensitive changes to their thermal equipment's operating parameters.

Improved uptime – There are many ways in which data center operators can improve uptime. It starts with having the ability to simulate critical infrastructure in software for purposes of scenario planning and optimizing operations. Scenario planning allows operators to plan for failures at critical points in the data center and plan for maintenance, workload migrations, and equipment replacement. Another way is to map and understand the dependencies of a workload downstream to the power ingress.

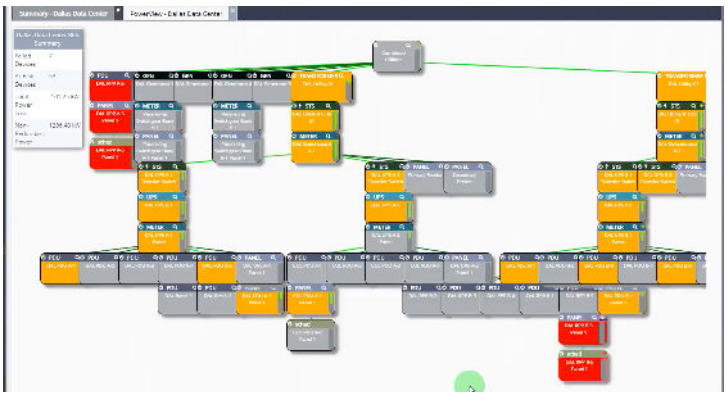
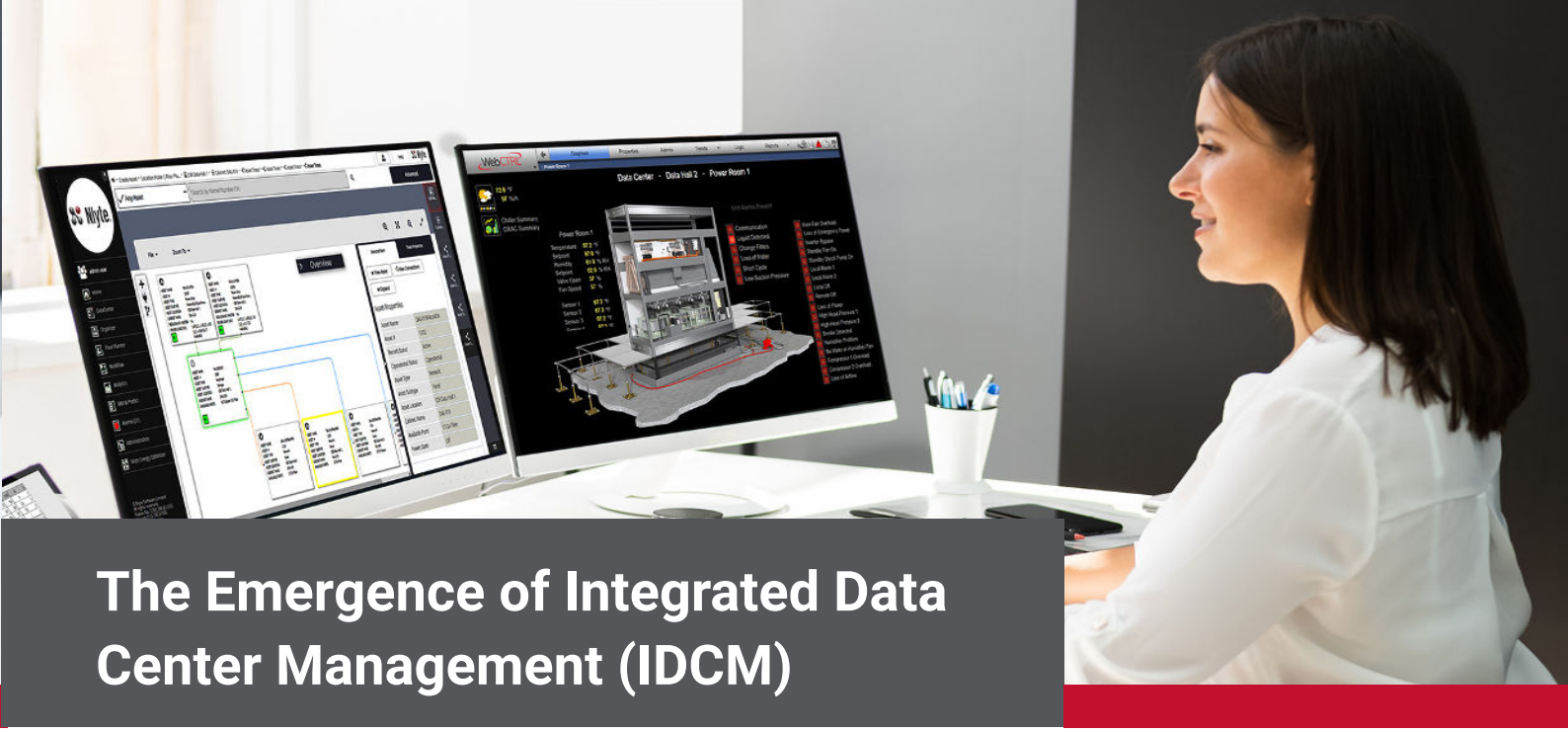


FIGURE 4: Nlyte Energy Optimizer Power Chain



The Emergence of Integrated Data Center Management (IDCM)

Some of the other benefits of implementing IDCM into your organization include:

- Holistic management results in reliable and efficient IT and facility data center management
- Transparency across the entire facility infrastructure for reliable decision-making delivering operational and efficiency improvements
- Balanced maintenance and workload availability
- Critical application support ensuring the infrastructure supports your critical application needs
- Gained visibility into the effects power and cooling have on workloads and assets and the organization
- Faster decision making through automated, integrated systems
- Target specific efforts to reduce costs and improve energy utilization
- Identify anomalies in the performance of your data center devices
- Automation of workflows to address detected security breaches or power anomalies

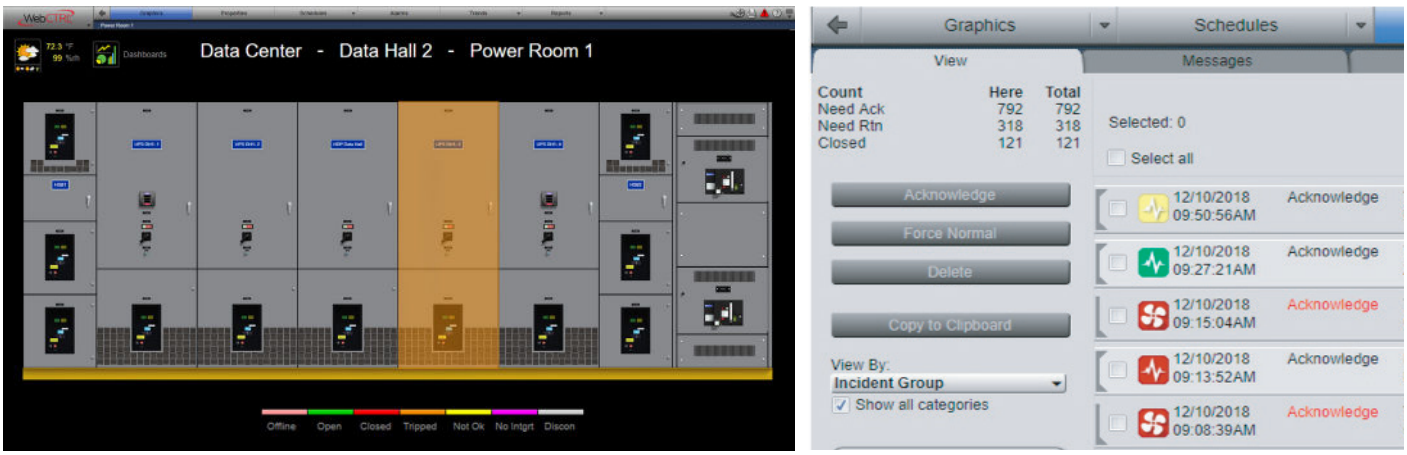


FIGURE 5: IDCM provides insight into the existing battery life on a UPS and can provide sufficient warning time in advance of failure for workloads to be properly and safely migrated.

Integrated Data Center Management Architectural Guide

Example of Mapping Cooling Chain to Local Events

With IDCM, a change in the cooling system's condition can now be traced down to the workload in the data center. Conversely, a physical change (planned or unplanned) to an asset in the data center can be reported back into the BMS system. With both DCIM and IDCM aware of the alert, a workflow can be initiated with specific details from workload to a chiller. In either case, the benefit is quick mitigation and avoidance of an extended unfavorable condition.

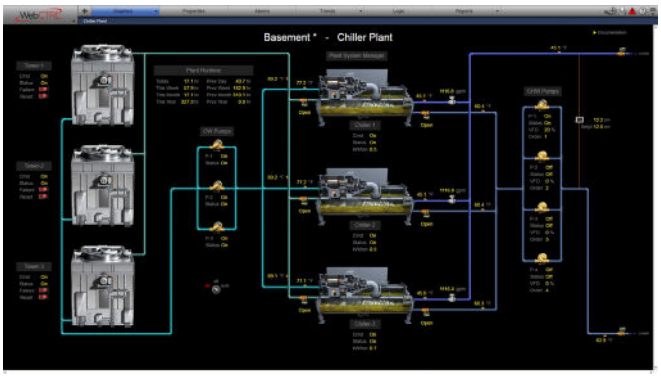


Image 6: Mechanical Room, Chiller Plant

Image 7: Multi-factor user-defned dashboard

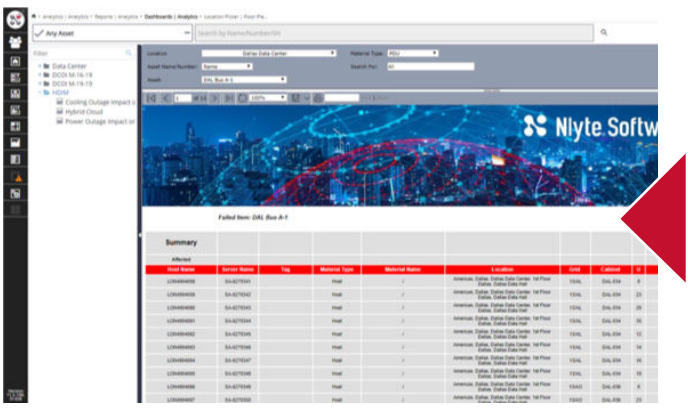


Image 9: DCIM affected asset view, by customer

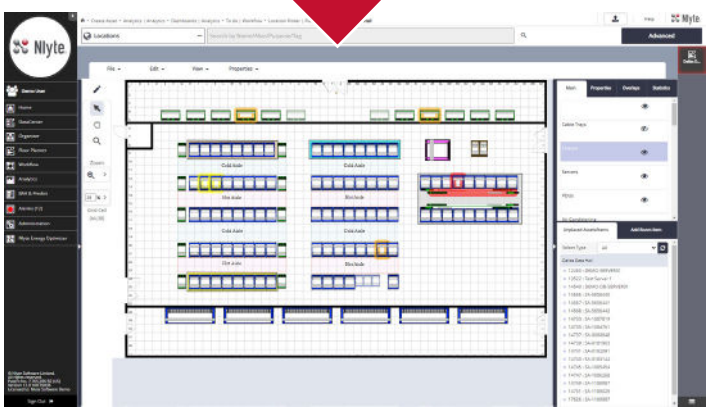


Image 8: Data Center floor view

Integrated Data Center Management Architectural Guide

Example of Analytics and Multi-variant Use Cases

In IDCM, the DCIM Machine learning provides a multi-variate analytics framework to correlate workload impact data with equipment behavior and anomalies such as: Detect Anomalies in overall power draw for cabinets in zones and forecasts individual device telemetry.

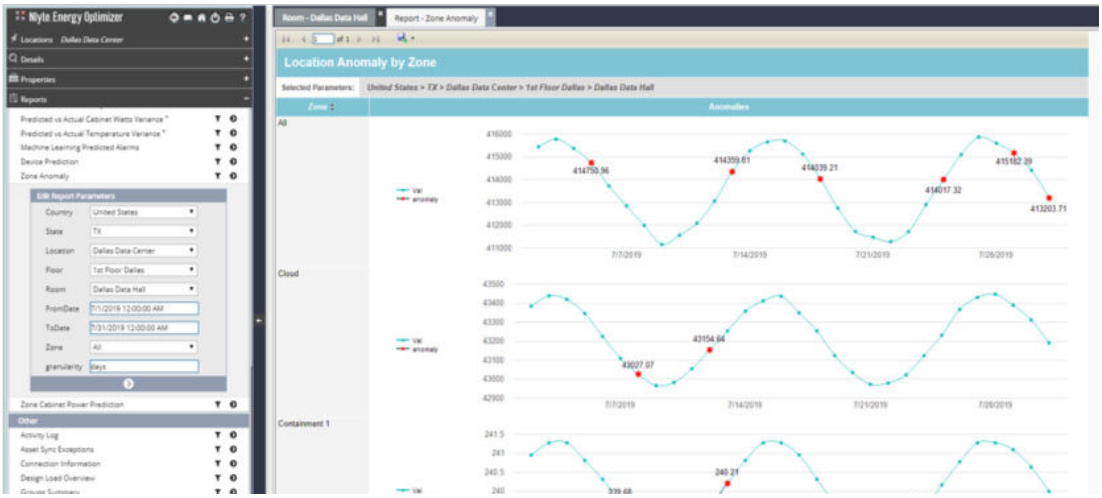


Image 10: Detect Anomalies in overall power draw for cabinets in zones

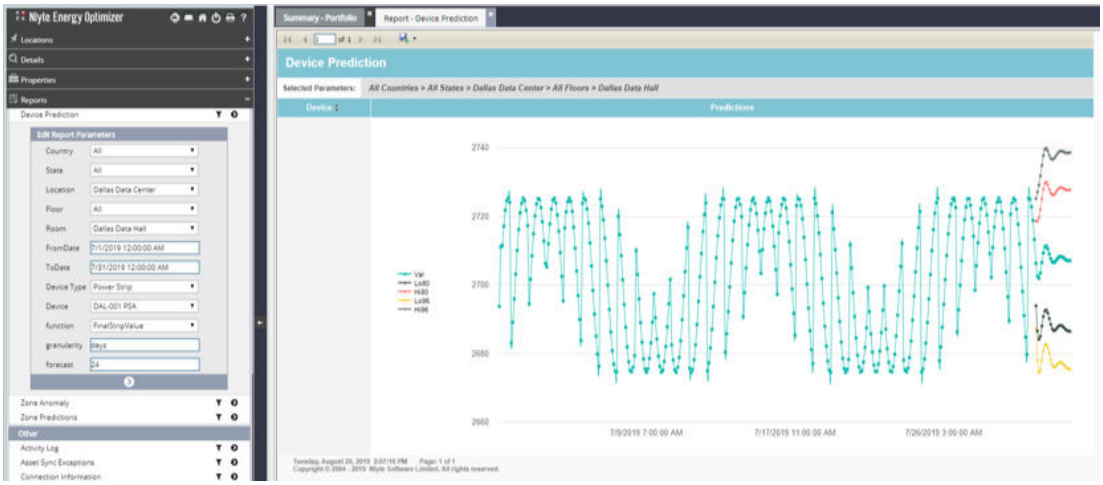


Image 11: Forecast Individual Device telemetry

Integrated Data Center Management Architectural Guide

Enhanced Colocation Cooling Capacity Management

Colocation providers don't have insight into tenant's workload demands or type of equipment and thus low predictability of cooling needs. Integrating DCIM floor maps and capacity management with the facilities BMS data on the cooling chain, colo providers can tie committed thermal SLAs to real-time demand.

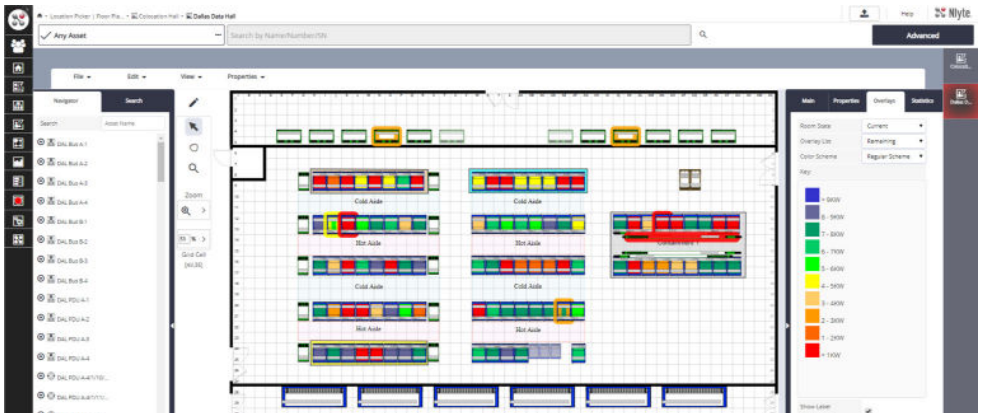


Image 12: Cooling capacity against commitments and thresholds

Full Stack Energy Prediction and Optimization

Machine learning can take the data from BMS and DCIM to understand energy supply and demand from the power plant to a single workload. This predictive analytics helps organizations avoid inadequate power supply and identify the optimal placement of workloads based on energy needs.

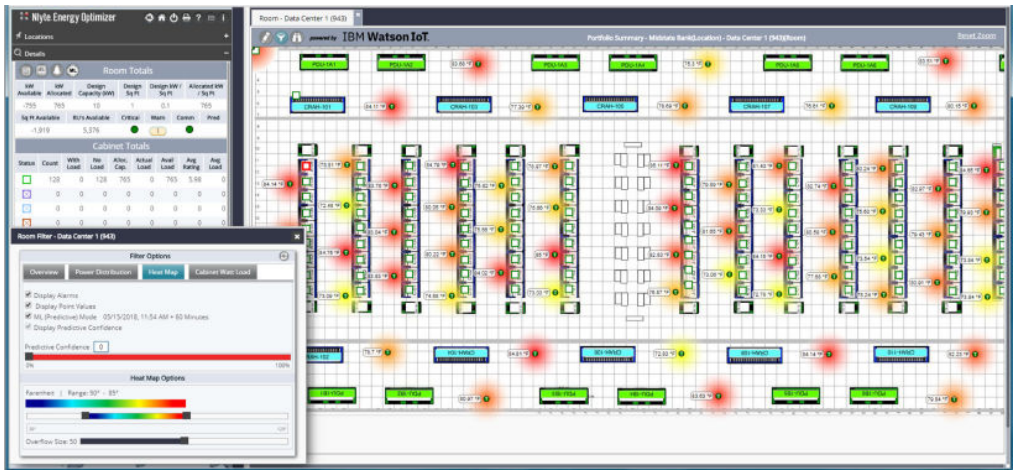


Image 13: Energy prediction and optimization with machine learning

About Nlyte Software

Nlyte Software helps teams manage their hybrid infrastructure throughout their entire organization – from desktops, networks, and servers to IoT devices – across facilities, data centers, colocation, edge, and the cloud. Using Nlyte's monitoring, management, inventory, workflow, and analytics capabilities, organizations can automate their hybrid infrastructure to reduce costs, improve uptime, and help compliance with regulatory and organizational policies.

Nlyte Software is a part of Carrier Global Corporation.

1150 Roberts Boulevard, Kennesaw, Georgia 30144, United States of America

732-395-6920 • Fax 732-395-6930 | nlyte.com | A Carrier Company