

# Leveraging DCIM Data

....to improve planning, lower operational costs,  
and speed up information delivery

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and Services*



# Session objectives

- ✓ *Challenges DCIM addresses*
- ✓ *How DCIM actually does this (real examples)*
- ✓ *Why it's important*

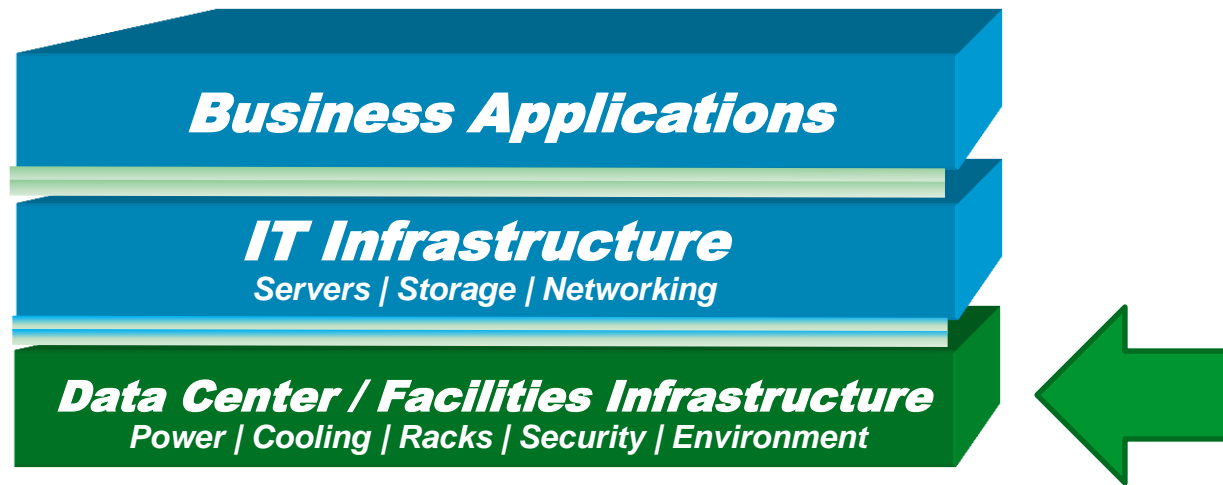
# Key Take Away



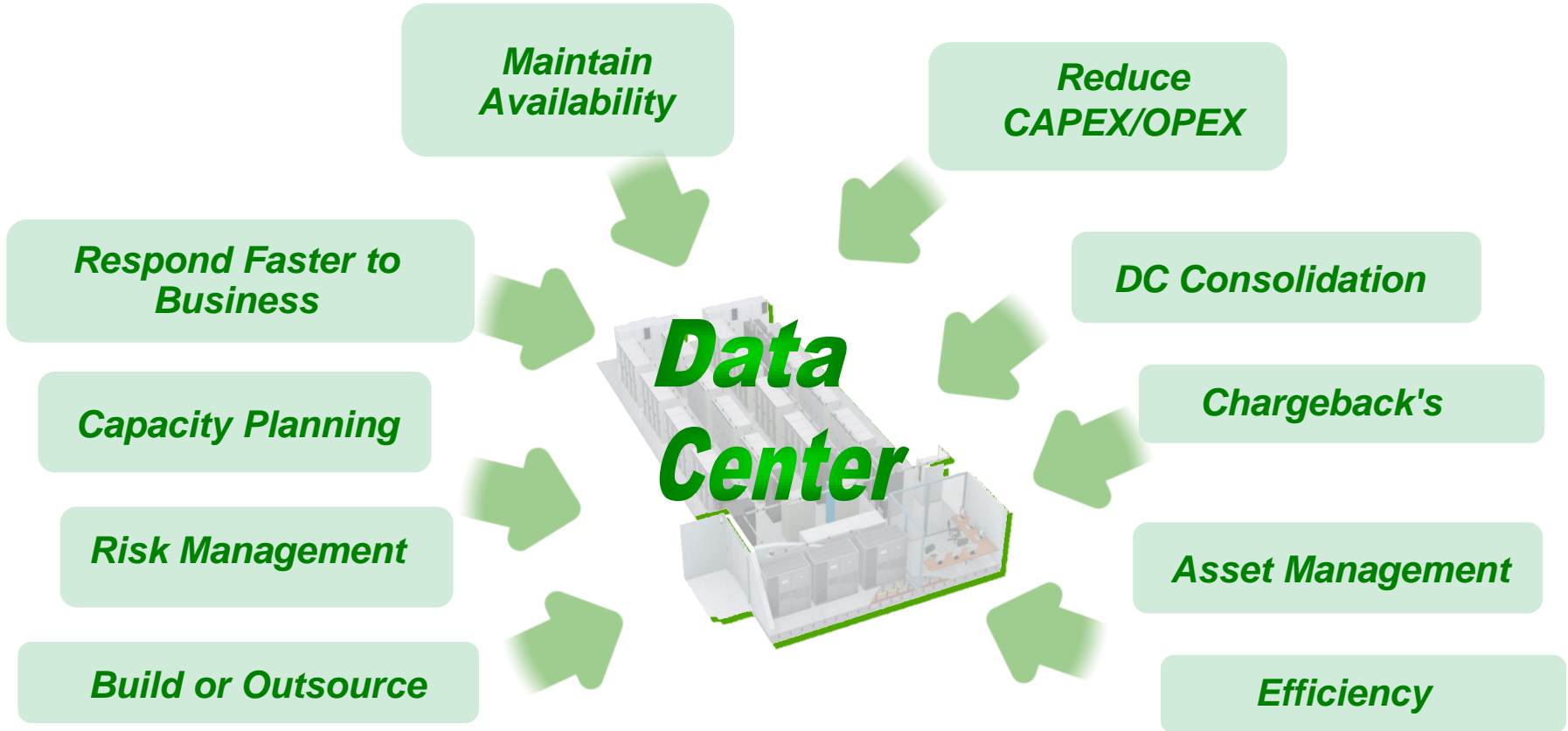
*Do You Have The  
Right Tools?*



# Overview Of DCIM



# DCIM data addresses key facility challenges...



**> Need to dramatically simplify planning, designing, deploying & operating data centers**

# Symptoms of Poor Data Center Operations

It's like the wild west!

I found some servers and I didn't know where they came from or who installed them

My CIO said "There's some white space – put the servers there!"

My hand at the back of the rack – THAT's how I find hot spots

I flew to London to put a Post-It note on a rack!

I use Excel (Access) to track what's there

When I come in every morning, I can HEAR if everything is okay

I could fix this if we had a fire – a BAD fire!

# Planning

The image displays the VMware vRealize Operations interface, which is used for infrastructure planning and monitoring. The top section shows a 'Planning' dashboard with a tree view on the left and a grid of performance charts on the right. The middle section features a 3D navigation view of a server room, showing server racks and airflow patterns. The bottom section shows a 'Capacity Group' view with a grid of server racks and a detailed alarm log at the bottom.

**Planning Dashboard (Top):**

- Navigation: Capacity Groups, Catalog
- Search: All Devices
- Virtual Machine Hosts: Search
- Network Management: Search

**3D Navigation (Middle):**

- 3D navigation: Nothing, Airflow (CFM), Max Intake/Exhaust, Avg Intake/Exhaust, Load (kW)
- Display cooling: Nothing, Temperature, Velocity plan
- Axis: x-axis, y-axis
- Plane position: 0 cm

**Capacity Group View (Bottom):**

- Navigation: Capacity Groups, Catalog
- Search: All Devices
- Devices: Search
- Alarms: Alarm Summary, Capacity Summary

**Alarm Log (Bottom):**

Description	Severity	Device Type	Location	Time Occurred	Device Instance
Communication with 192.168.1.24 has been lost.	Failure	SNMP Device	Core R2 (192.168.1.24) [DC:DFW]	21-07-10 09:36:56	192.168.1.24
Communication with 192.168.1.27 has been lost.	Failure	SNMP Device	Core R1 (192.168.1.27) [DC:DFW]	21-07-10 09:36:52	192.168.1.27
Communication with 192.168.1.3 has been lost.	Failure	SNMP Device	Switch R2 (192.168.1.3) [DC:DFW]	21-07-10 09:49:30	192.168.1.3
A new host (fresh) related events at Phase 2	Warning	Host CPU	Host R1 (192.168.1.20) [DC:DFW]	21-07-10 09:50:20	192.168.1.20
A new host (fresh) related events at Phase 1	Warning	Host CPU	Host R1 (192.168.1.20) [DC:DFW]	21-07-10 09:50:29	192.168.1.20
A new host (fresh) related events at Phase 1	Warning	Host CPU	Host R1 (192.168.1.20) [DC:DFW]	21-07-10 09:50:29	192.168.1.20

# Common Planning Questions Answered By DCIM Tools

Where do I place my next server?

Do I need to spread out my blade servers to get reliable operations?

Do I have underutilized servers that could be consolidated ?



*IT Manager*

How will a new server impact the existing branch circuit?

How does my trending look for server CPU utilization across the entire data center?

Does the existing power and cooling equipment have the capacity to accommodate new server technologies?



# Provisioning New Systems

The screenshot displays a software interface for provisioning new systems in a data center. The main window is titled "New Equipment Info" and shows details for a PowerEdge 2650 server. The equipment has a load of 409 and 2 inlets, with a U-height of 2. The interface includes a navigation pane on the left with categories like "Power Distribution", "Server", and "Dell". A search bar is present, and a list of devices is shown, including PowerEdge 2650, 2970, and 7250. The main area displays a "Status for: PowerEdge 2650 in rack: Rack 2/D/Berlin DC/Emea/" with several status indicators: "Rack airflow supports equipment", "Rack supports equipment's load", "Equipment fits into rack", "Floor supports weight of equipment", and "Capacity group redundancy support". Below this, there are fields for "Add: 1" and "To: Best Rack" with an "Add" button. A "Show location" link is also visible. The bottom right corner shows "No Alarms" and "User: apc | Server: localhost".

**New Equipment Info**

Equipment: PowerEdge 2650  
 Load: 409 Inlets: 2  
 U Height: 2

**Status for: PowerEdge 2650 in rack: Rack 2/D/Berlin DC/Emea/**

- Rack airflow supports equipment
- Rack supports equipment's load

**New Equipment Info**

Equipment: PowerEdge 2650  
 Load: 409 Inlets: 2  
 U Height: 2

**Assign tags (0)**

**Required Redundancy**

Redundancy: N+1

**Required network ports**

Copper: 2  
 Fiber: 0

**Status for: PowerEdge 2650 in rack: Rack 3/D/Berlin DC/Emea/**

- Rack airflow supports equipment
- Rack supports equipment's load
- Capacity group supports equipment's redundancy
- Rack supports equipment's Watts per U-height
- Rack tags support equipment tags
- PDU supports rack PDUs voltage
- Rack supports weight of equipment
- Rack PDU supports equipment's load
- Rack PDU supports equipment's voltage
- Available copper-based network ports
- Equipment fits into rack
- Floor supports weight of equipment
- Capacity group redundancy support

Add: 1  
 To: Best Rack Add

Show location

captured.

- There is insufficient cooling available to support adding the selected equipment to the selected rack since too little of the rack's exhaust airflow will be captured.

Parent topic: Placement Status

No Alarms User: apc | Server: localhost

# CPU Utilization – Individual Servers

StruxureWare for Data Centers: Operations Suite

File Edit Tools System Setup Window Help

Operations Data Center Planning Analytics Reports

Navigation Capacity Groups Catalog Global DC01 Berlin DC San Diego Data Center

Search: **Overlay server level CPU utilization data on the rack layout.**

External Systems: Rack-Mount Equipment Placement

Search: Monitoring swisxc001 Power Row A Row B Row C Solution Center Unassigned Valhal\_DGA Virtualization

Equipment Placement Advisor Equipment loading Physical **Server CPU %**

**Color-coded bars show the avg. CPU utilization.**

**PowerEdge 7250**

**General**  
 Model: PowerEdge 7250  
 Manufacturer: Dell  
 Type: IT Equipment  
 Location: U-7/Rack 4/F/Berlin DC/Emea/  
 Barcode: -

**Power Consumption**  
 Estimated Load: 1500 W  
 Redundancy: 2N+1

**Power Connection:**  
 Connected to: Rack PDU, Metered, Zero U, 22kW, 400V, (6) C19 - Phase: L3  
 Connected to: Rack PDU, Metered, Zero U, 22kW, 400V, (6) C19 - Phase: L3

**Custom Properties**  
 Contact: Henrik Daring  
 OS: Windows 2003 Server

**CPU Utilization**

**Server tooltips include detailed utilization data.**

Search in: All columns

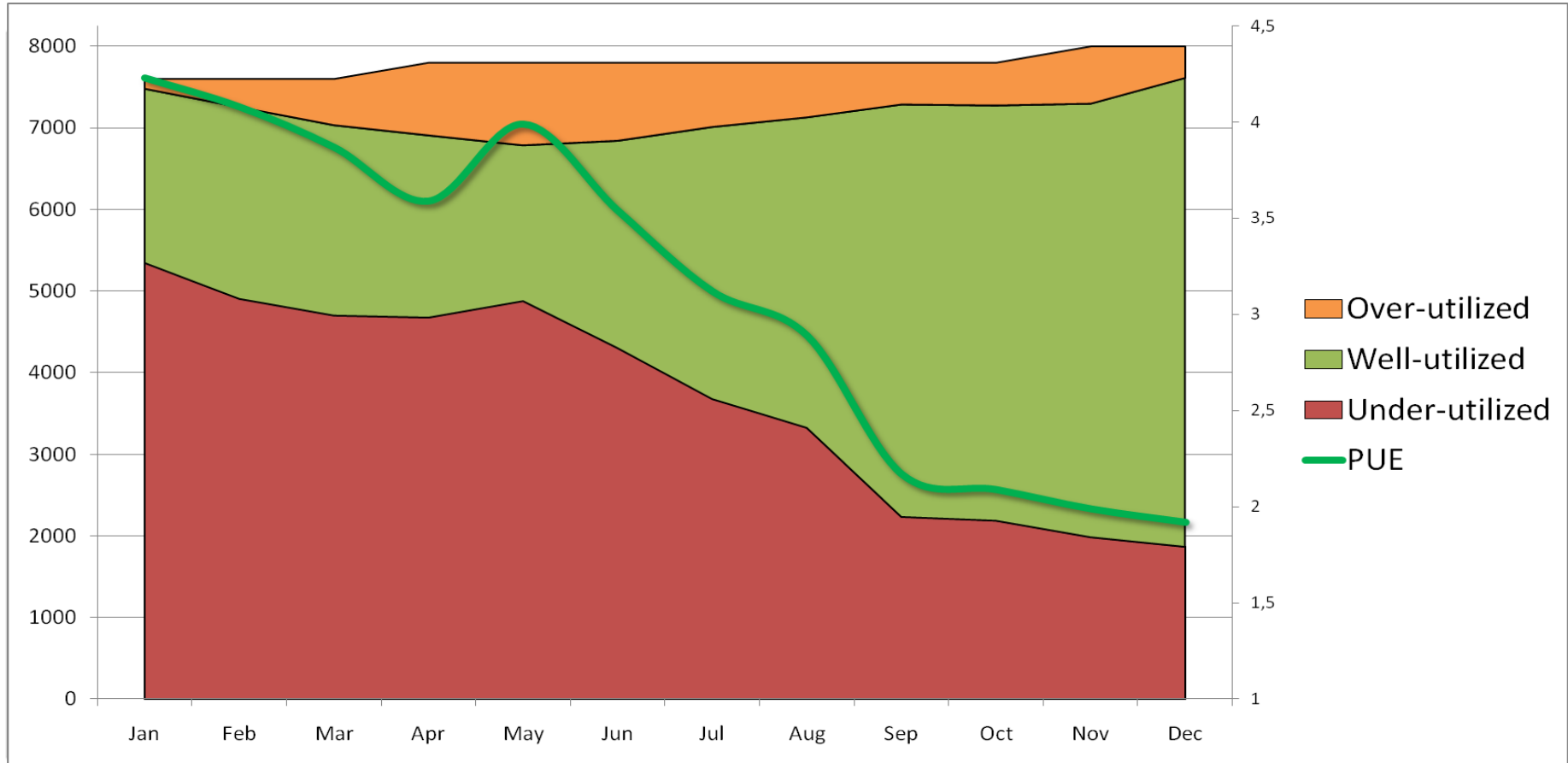
Model Name	Location	Manufacturer's Nameplate (W)
PowerEdge M710	6/PowerEdge M1000E/U-11/Ra...	2360
InRow RC Chilled Water, 230V	E/Berlin DC/Emea/	1380
HP Integrity BL860c Server series 7000	12/HP BladeSystem c7000 Encl...	0
NetShelter SX 42U 600mm Wide x 1070mm ...	D/Berlin DC/Emea/	
Rack PDU, Metered, Zero U, 22kW, 400V, (6) ...	Left-rear/Rack 5/E/Berlin DC/E...	
PowerEdge M805	7/PowerEdge M1000E/U-11/Ra...	0
PowerEdge M805	3/PowerEdge M1000E/U-11/Ra...	0
Downflow CRAC	Berlin DC/Emea/	0
Rack PDU, Metered, Zero U, 11kW, 230V, (36)...	Left-rear/Rack 1/A/Berlin DC/E...	

# CPU Utilization – Trending for Entire DC



## Server CPU Utilization

Report date: 17/08/2011



# Operations

The image displays the VMware vRealize Operations Suite interface, which is used for monitoring and managing data center operations. The interface is divided into several main sections:

- Capacity Center:** Shows a tree view of the data center hierarchy, including servers, racks, and rooms. It provides a high-level overview of capacity and performance.
- Planning:** Offers tools for forecasting and planning future capacity requirements based on current trends and usage patterns.
- Analytics:** Provides detailed performance metrics, including CPU usage, memory consumption, and network traffic, across various components.
- 3D navigation:** A 3D visualization of the data center floor plan, showing server racks and their physical layout. It includes a velocity scale and navigation controls.
- St. Louis, Austin, Rhode Island:** Regional capacity and performance dashboards, each with a circular gauge and a map of the region.
- External Sp. Rack-Mou.:** A section for monitoring external storage and network equipment.
- Monitoring:** A central monitoring area with a search bar and filters to track specific devices and alarms.
- Network Management:** Tools for managing network configurations and dependencies.
- Alarms:** A detailed view of active alarms, including their severity, description, and the affected devices.

The interface is highly customizable, allowing users to view data in various formats such as tables, charts, and 3D models. The bottom right corner shows an alarm log with the following details:

Description	Severity	Device Type	Location	Time Occurred	Device Instance
Communication with 192.168.1.24 has been lost.	Failure	SNMP Device	Core R2 (192.168.1.24) [DC-02A]	21-07-10 09:36:56	192.168.1.24
Communication with 192.168.1.27 has been lost.	Failure	SNMP Device	Core R1 (192.168.1.27) [DC-02A]	21-07-10 11:06:52	192.168.1.27
Communication with 192.168.1.3 has been lost.	Failure	SNMP Device	Switch S2 (192.168.1.3) [DC-02A]	21-07-10 14:49:30	192.168.1.3
A new event had threshold relation exists at Phase 2	Warning	Rack PDU	Rack PDU1 (192.168.1.20) [DC-02A]	21-07-10 10:50:20	192.168.1.20
A new event had threshold relation exists at Phase 1	Warning	Rack PDU	Rack PDU1 (192.168.1.20) [DC-02A]	21-07-10 10:50:29	192.168.1.20
A new event had threshold relation exists at Phase 1	Warning	Rack PDU	Rack PDU1 (192.168.1.20) [DC-02A]	21-07-10 10:50:29	192.168.1.20

# Common Operational Questions Answered by DCIM Tools

What projects are due tomorrow & their current status?

I lost a fan on my CRAC – what do I do now?

How can I address hotspots in my data center?

What's my PUE?

What's the overall health of my data center?

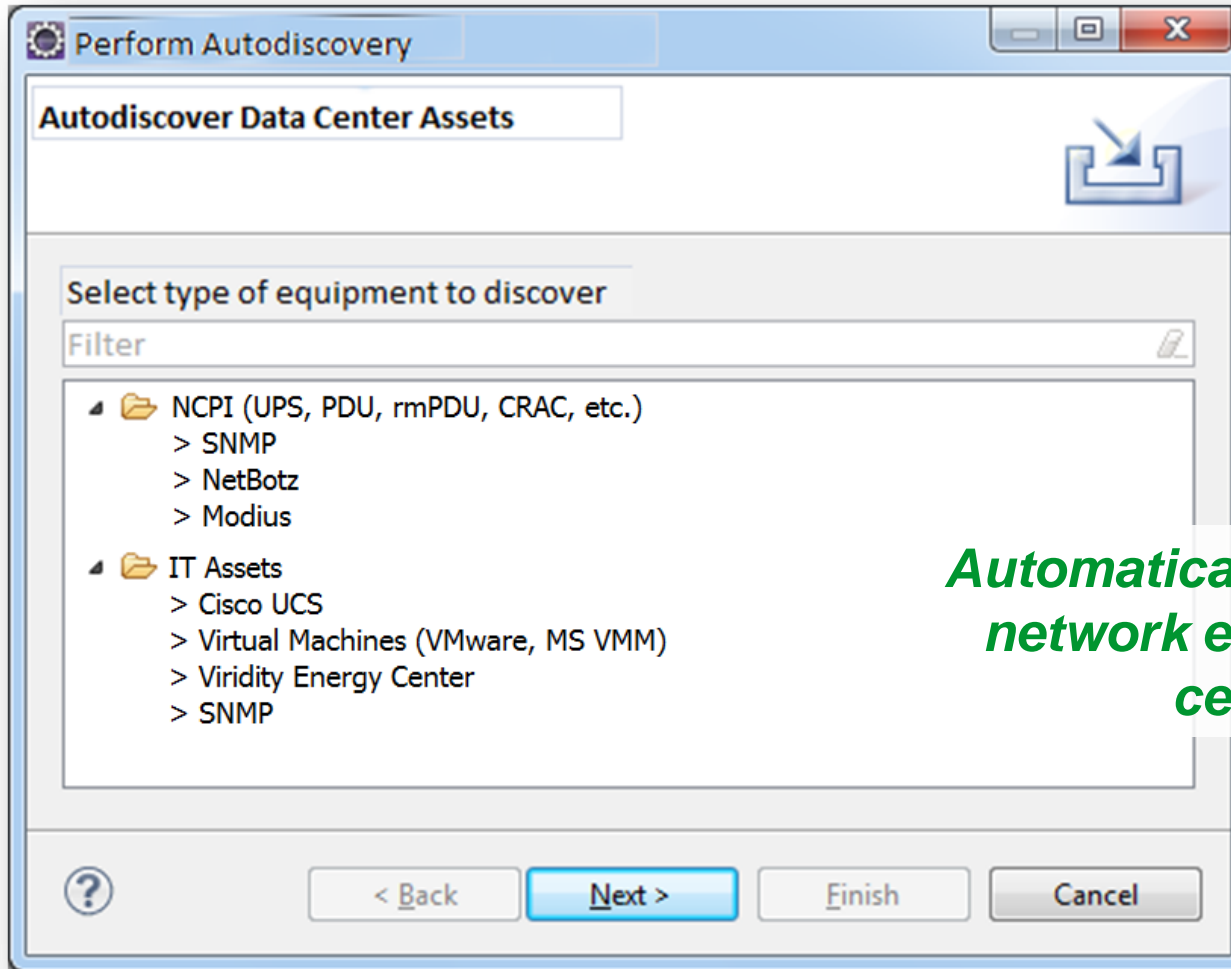
What do I have in my data center?

One of my racks has an exceeded power capacity - what can I do?



*IT & Facility  
Managers*

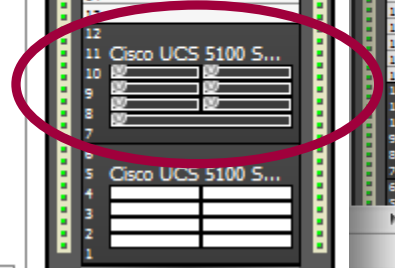
# Auto Discover IT Assets



*Automatically discover network enabled data center assets.*

# Provision Discovered Assets

*Discovered assets can be placed directly into the data center model.*



*The model is populated based on the data retrieved during discovery.*

The screenshot displays the Cisco Live! interface for a data center model. The main area shows a perspective view of server racks labeled R-1, R-2, R-4, and R-5. Each rack contains multiple server slots, with some slots populated with server units. A red circle highlights a specific server unit in rack R-5, slot 11, labeled "Cisco UCS 5100 S...".

On the left side, there is a navigation pane with a tree view of discovered assets. The tree structure is as follows:

- scom.demo.apcc.com
  - UCS Manager
    - Chassis 1
      - Fan Modules
      - IO Modules
      - PSUs
      - Server
    - Chassis 2
  - vCenter.demo.apcc.com

At the bottom of the interface, there is a table with the following columns: Item, Location, and Phase. The table contains one row:

Item	Location	Phase
U-2	Cisco Live!/ 63.236 kW 700 W	

The interface also includes a menu bar (File, Tools, Demo Tools, Window, Help), a toolbar with icons for Operations Data Center, Planning IT Change, and Analytics Reports, and a status bar at the bottom right showing "No Alarms" and "User: apc | Server: localhost".

# Capacity & Alarms in One View

StruxureWare for Data Centers: Operations Suite

File Edit Tools Demo Tools System Setup Window Help

Operations Data Center Planning Data Center Analytics Reports

Navigation Capacity Groups Catalog

Search:  Clear

Manhattan Park Ave. DC

Search:  Clear

- Kolding
  - Acquired Company
  - Kolding Demo Center
  - Silicon Allé UPS Room
- New York
  - Manhattan Park Ave. DC
    - R1
      - A-feed UPS R1
      - A-feed PDU R1
      - Rack R1.1
        - Front Mounted
        - Left Rear Mounted
        - Right Rear Mounted
        - Crac R1.1
        - Rack R1.2

External Systems Rack-Mount Equipment Placement

Search:  Clear

- Monitoring
  - swisxc001
    - Power
      - pdu-d-1(192.168.1.113) (192.168.1.113)
      - ups-d-1(192.168.1.112) (192.168.1.112)
    - Row A
    - Row B
    - Row C
    - Solution Center

Capacity & Alarms in One View

World map showing locations: New York, Paris, Kolding.

**New York**

Capacity: Power, Cooling, U-Space, Network

Alarms: 0

**Paris**

Capacity: Power, Cooling, U-Space, Network

Alarms: 0

**Kolding**

Capacity: Power, Cooling, U-Space, Network

Alarms: 12

10 (Critical) 2 (Warning) 0 (Info)

Network Management Power Dependency Equipment Browser Recommendation Placement Status

Search:  All columns Clear Search 1075 of 1264 items shown

Model Name	Barcode	Location	Manufacturer	Room	Row	Rack	U-Position	U-Height	Name
MuPa 2		U-41/Rack R3.4/R3/Manhattan Park Ave. DC/New York	Mustex	Manhattan Park Ave. DC	R3	Rack R3.4	41	1	Mustex Patch Panel
Dell PowerEdge Server		U-25/Rack R3.4/R3/Manhattan Park Ave. DC/New York	Dell	Manhattan Park Ave. DC	R3	Rack R3.4	25	1	Server 70
Dell PowerEdge Server		U-24/Rack R3.4/R3/Manhattan Park Ave. DC/New York	Dell	Manhattan Park Ave. DC	R3	Rack R3.4	24	1	Server 69
Dell PowerEdge Server		U-23/Rack R3.4/R3/Manhattan Park Ave. DC/New York	Dell	Manhattan Park Ave. DC	R3	Rack R3.4	23	1	Server 68
Dell PowerEdge Server		U-22/Rack R3.4/R3/Manhattan Park Ave. DC/New York	Dell	Manhattan Park Ave. DC	R3	Rack R3.4	22	1	Server 67
Dell PowerEdge Server		U-21/Rack R3.4/R3/Manhattan Park Ave. DC/New York	Dell	Manhattan Park Ave. DC	R3	Rack R3.4	21	1	Server 66

10 (Critical) 2 (Warning) User: apc | Server: isxc-20



# Alarm View

- Highlighting entire rack where alarm is present

The screenshot displays a data center management software interface. The main view shows a rack layout with two rows of racks, labeled A and B. Rack A.2 is highlighted in red, indicating an alarm. The interface includes a navigation pane on the left, a search bar, and a list of devices. The bottom section shows a table of alarms and their details.

Description	Severity	Device Type	Location	Time Occurred	Device Hostname
Communication with '192.168.1.14' has been lost.	Failure	SNMP Device	Crac R2.1/A/Berlin DC/EMEA/	23-07-10 08:56:56	192.168.1.14
Communication with '192.168.1.22' has been lost.	Failure	SNMP Device	Crac R1.5/B/Berlin DC/EMEA/	22-07-10 17:00:52	192.168.1.22
Communication with '192.168.1.3' has been lost.	Failure	SNMP Device	Rack R2.2/A/Berlin DC/EMEA/	21-07-10 14:49:30	192.168.1.3
A low load threshold violation exists at Phase 3	Warning	Rack PDU	Rack R1.3/B/Berlin DC/EMEA/	21-07-10 15:50:29	192.168.1.252
A near overload threshold violation exists at Phase 2	Warning	Rack PDU	Rack R1.3/B/Berlin DC/EMEA/	21-07-10 15:50:29	192.168.1.252
A low load threshold violation exists at Phase 1	Warning	Rack PDU	Rack R1.3/B/Berlin DC/EMEA/	21-07-10 15:50:29	192.168.1.252

**Alarm Details**

**Description**

A low load threshold violation exists at Phase 3

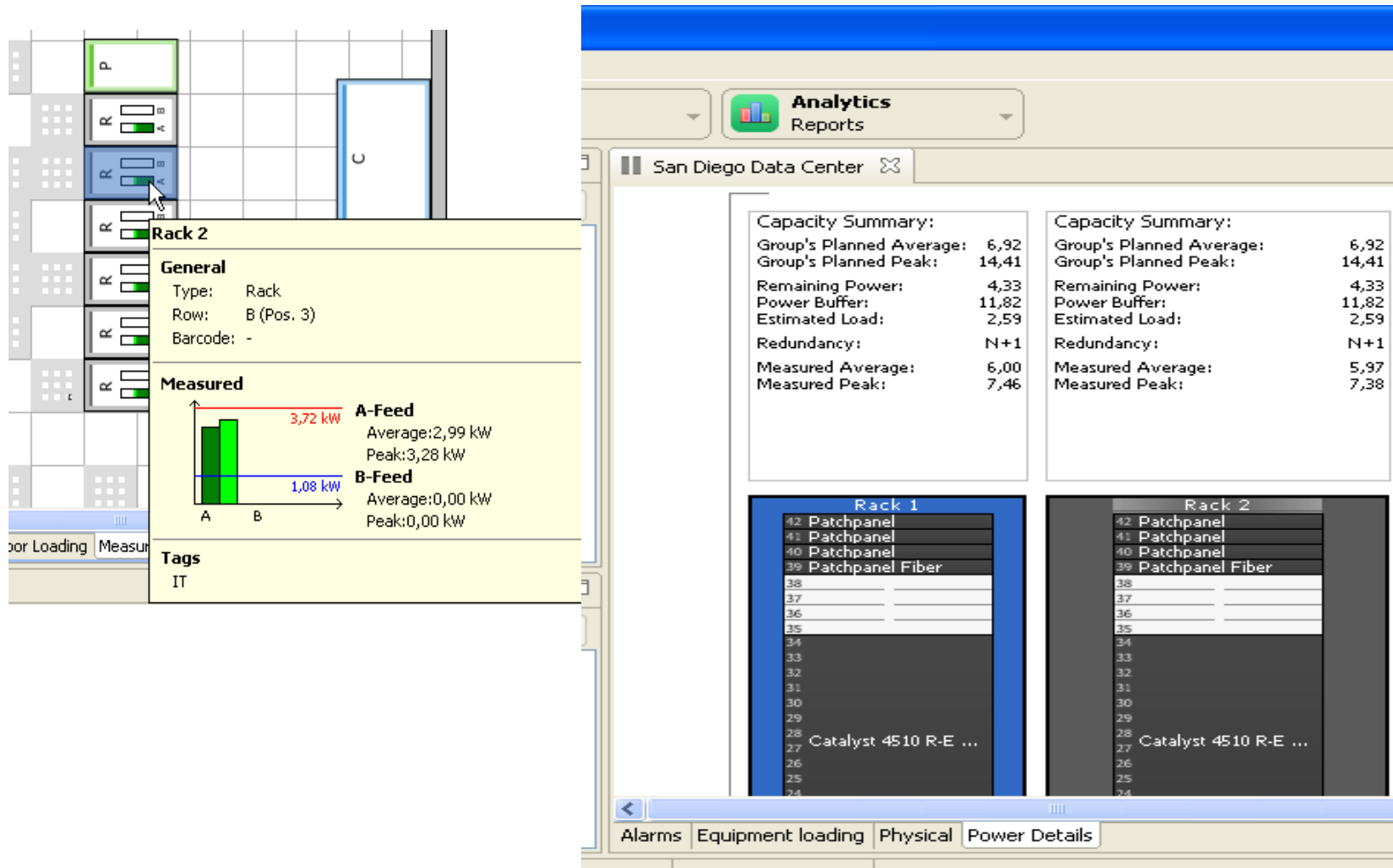
**Recommended Action**

Recommended Action: Make sure the load equipment is operational and plugged in securely. If the problem persists, contact APC Support (<http://www.apc.com/go/direct/index.cfm?tag=support>).

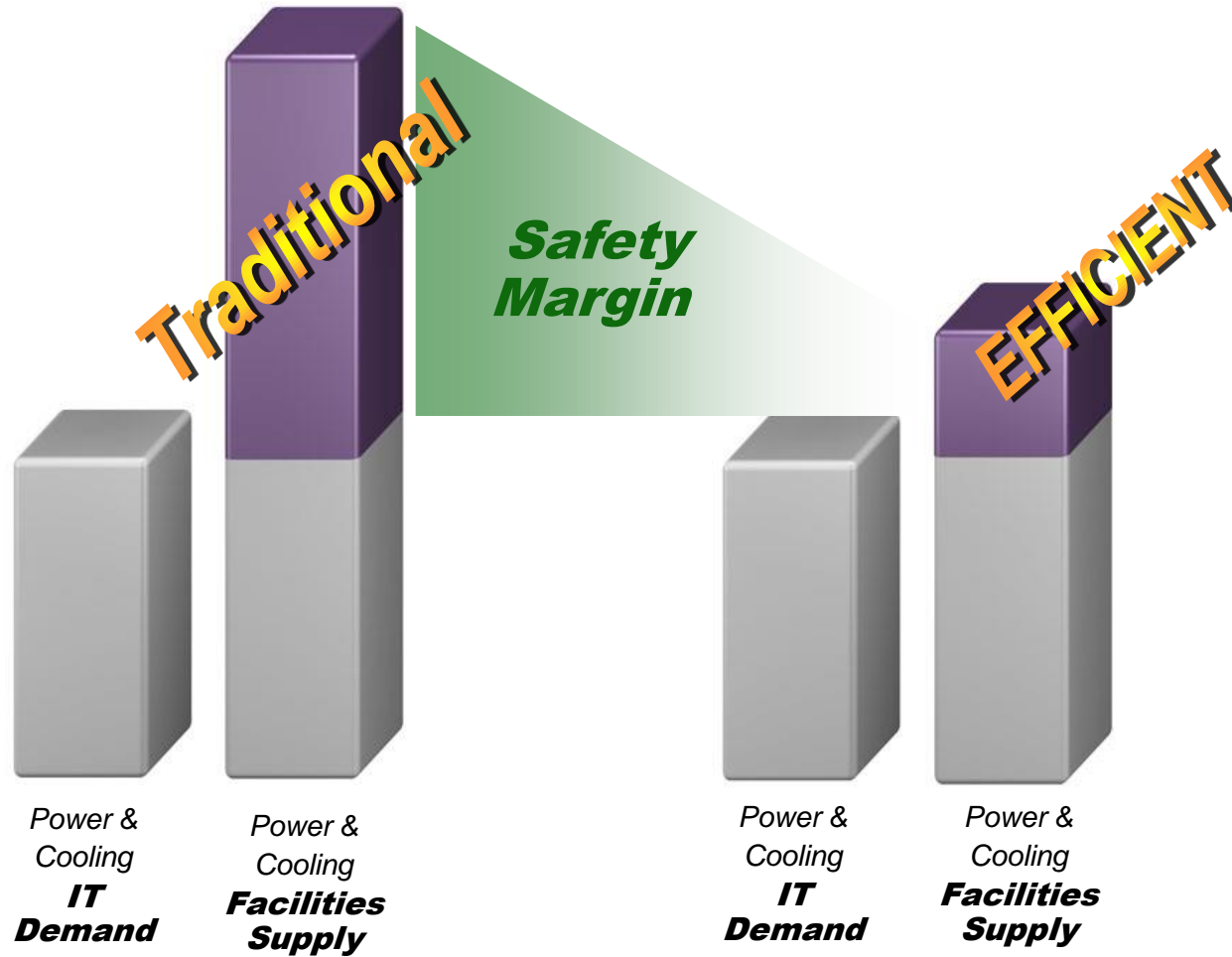
# Measure Real-Time Power

- *Real-time Power Consumption > Power Details Overlay*

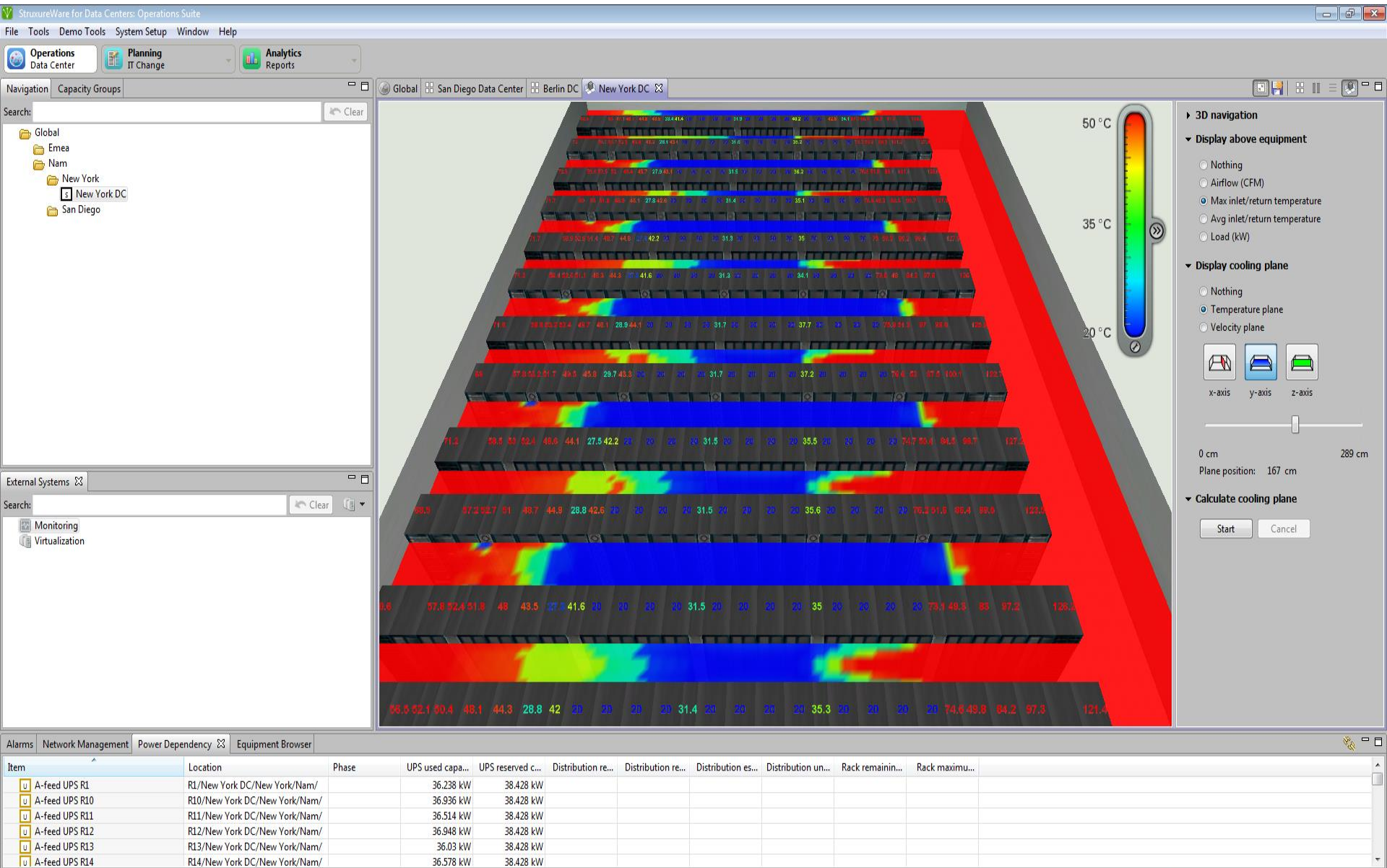
*Real-time power consumption displayed as an overlay on floor and rack layout*



# Lower Safety Margins Saves Money



# Air Temperature & Velocity



# Communication Between Virtual & Physical Worlds

Why move a VM?

*Not enough COMPUTE resources...*

*The virtual machine manager  
watches this side*



- *Not enough PROCESSOR*
- *Not enough MEMORY*
- *Not enough STORAGE*



*Reasons on both sides...*

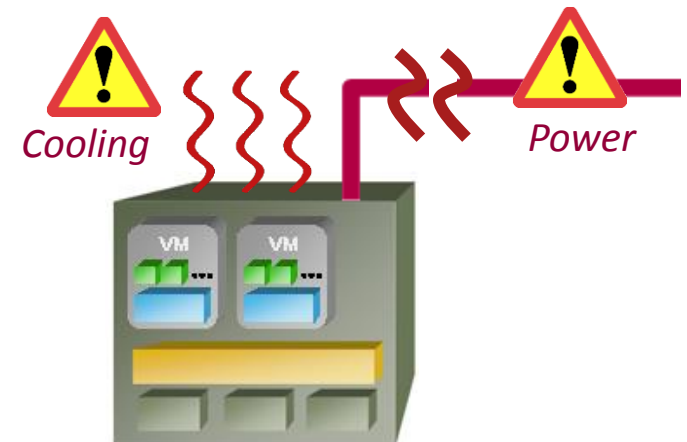
*There is physical infrastructure DANGER ...*

*OR*

*DCIM  
watches this side*



- *Power outage – on battery, low battery*
- *Cooling trouble – failure of a cooling device*
- *Loss of redundancy in power or cooling*



# Analytics

The image displays several screenshots of the InfraStratix Operations software interface, illustrating its capabilities in data center analytics and management. The top section shows a 'Data Center' view with a tree structure on the left and a grid of server racks on the right, each with associated performance metrics. Below this, a '3D navigation' window provides a 3D perspective of server racks, with a color-coded temperature scale and various display options like 'Airflow (CFM)', 'Max Intertel', and 'Load (KW)'. The middle section features a 'Network Management' view with a map of the United States, highlighting specific data centers like St. Louis, Austin, and Rhode Island, along with capacity and alarm indicators. The bottom section shows a 'Rack-Mou.' view with a grid of server racks, each labeled with a rack ID and status, and an 'Alarms' table at the bottom right.

Description	Severity	Device Type	Location	Time Occurred	Device hostname
Communication with 192.168.1.24 has been lost.	Failure	SWP Device	Core R2 (192.168.1.24) (SWP Device)	23-07-10 08:56	192.168.1.24
Communication with 192.168.1.27 has been lost.	Failure	SWP Device	Core R1 (192.168.1.27) (SWP Device)	23-07-10 11:06:52	192.168.1.27
Communication with 192.168.1.3 has been lost.	Failure	SWP Device	Rack R2 (192.168.1.3) (SWP Device)	23-07-10 14:49:30	192.168.1.3
A new inverted threshold relation exists at Phase 2	Warning	Rack PDU	Rack PDU (192.168.1.202) (SWP Device)	23-07-10 01:50:29	192.168.1.202
A new inverted threshold relation exists at Phase 1	Warning	Rack PDU	Rack PDU (192.168.1.202) (SWP Device)	23-07-10 01:50:29	192.168.1.202

# Common Analytical Questions Answered By DCIM Tools

When will I need to build another data center?

How do I know if our energy efficiency initiative succeeded?

When will my data center run out of power and cooling capacity?

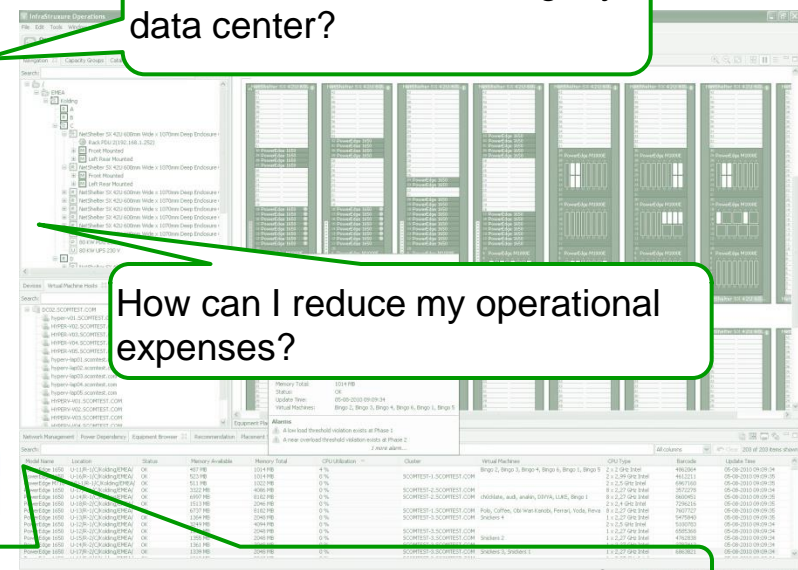
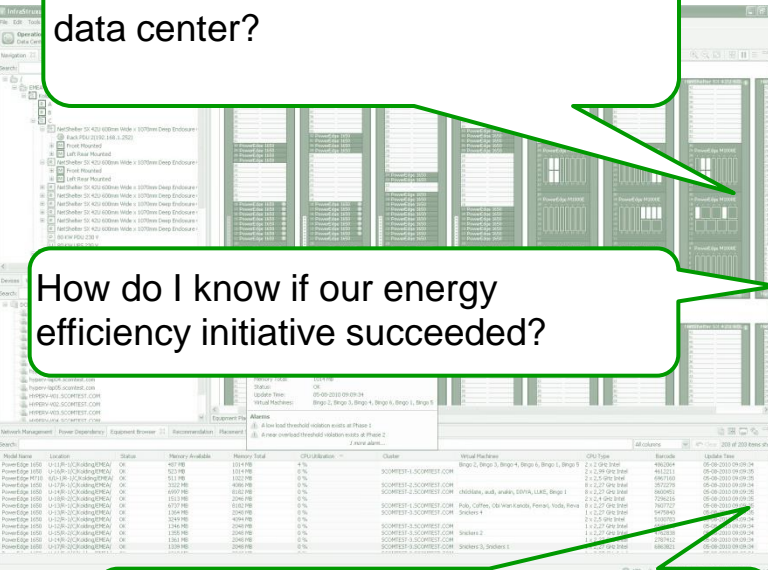
What's the cost of running my data center?

How can I reduce my operational expenses?

Have we met our regulatory requirements?



CIO

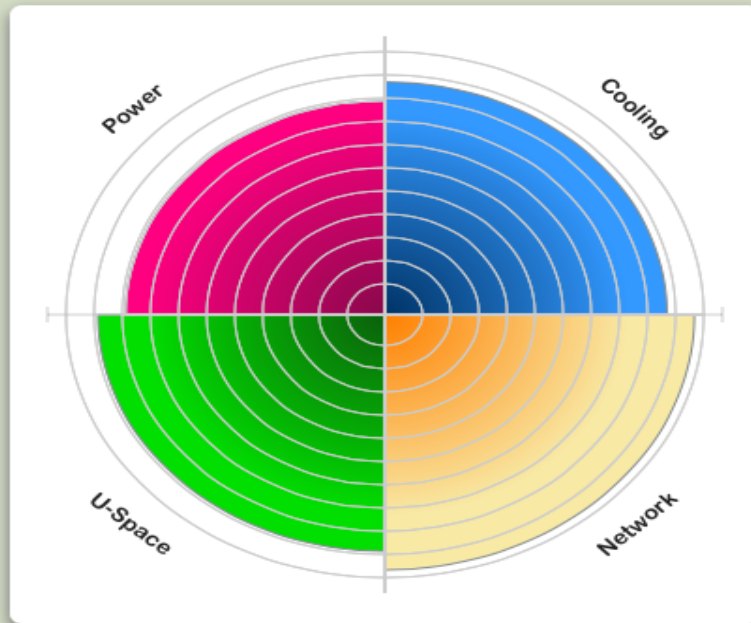


# Capacity Dashboard

## Capacity overview

NAM

### Overview



Remaining Capacity

 3 Month(s)

### Power

Remaining	3 Year(s)
Capacity	80 kW
Used	81.3%

### Cooling

Remaining	2 Year(s)
Capacity	200 kW
Used	88.5%

### U-Space

Remaining	1 Year(s)
Capacity	1000 U-pos
Used	90%

### Network

Remaining	3 Month(s)
Capacity	140 Ports
Used	97.1%

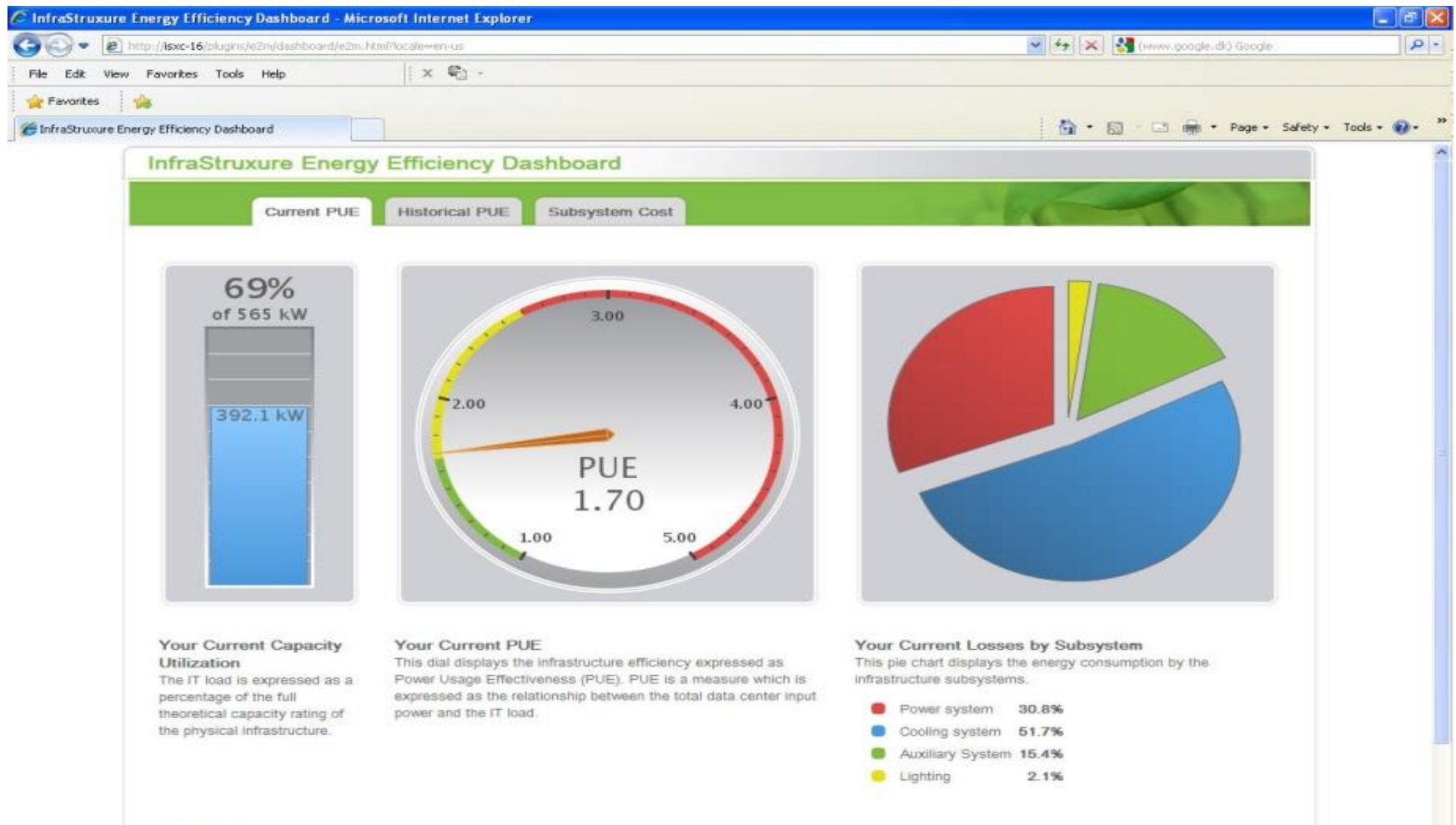




# Control Energy Usage in Your Data Center

*“Energy use is a substantial cost of IT operations, in some cases exceeding the cost of the IT hardware itself!”*

*Quote US Department of Energy, May 2007*



# Why It's Important?



## Financial Benefits

- Improve OpEx and CapEx
- Reduce costs by 10-30% annually
- 3 -18 month ROI is typical



## Automate Manual Processes

- Reporting, inventory, moves/adds/changes, capacity planning, outage impact analysis, energy measurements
- Respond faster to business initiatives by as much as 50%
- Dramatically improve productivity



## Improve Operational Intelligence

- Measure Data Center performance (Energy Efficiency, Resource Utilization, Process Efficiency)
- Link KPI's to strategies & actions that drive improvement
- Holistic view of Data Center for all roles



*Overall, DCIM helps you gain control of your infrastructure so that it doesn't control your business*

# Key Take Away



*Do You Have The  
Right Tools?*

