

Data Center Infrastructure Management: Improve Data Center Capacity Utilization

Khaled Nassoura, PE

Session P06, 9:45 – 10:45AM, September 12, 2011

DATA CENTER WORLD[®]
AFCOM_®

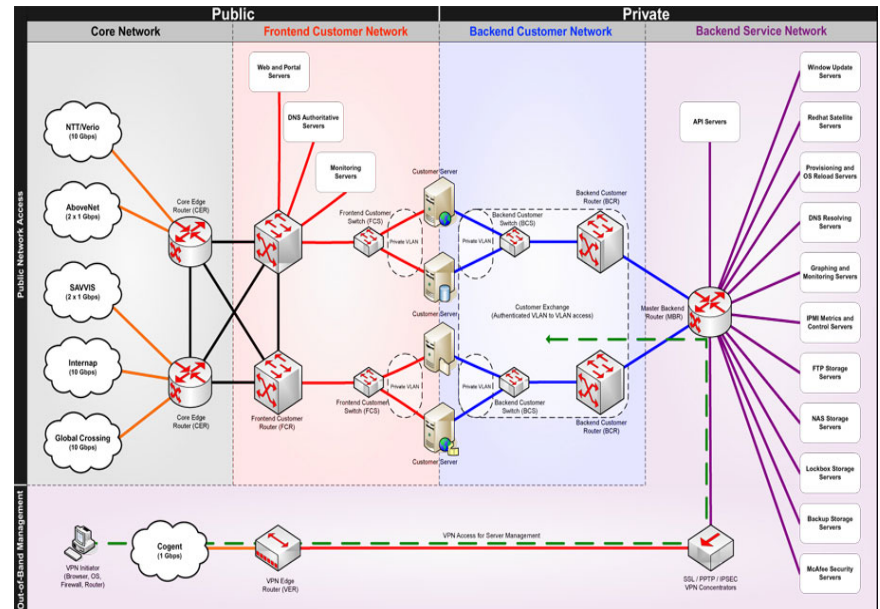
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Know more. Manage smarter.[™]

Why DCIM

Data Center
Size + Density

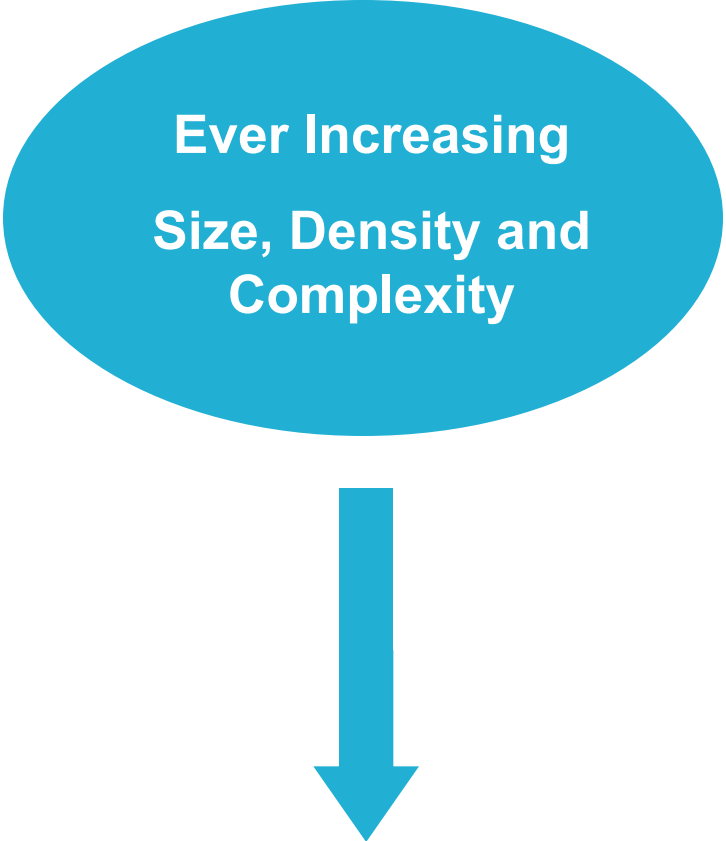


Data Center
Complexity



Why DCIM

**Ever Increasing
Size, Density and
Complexity**



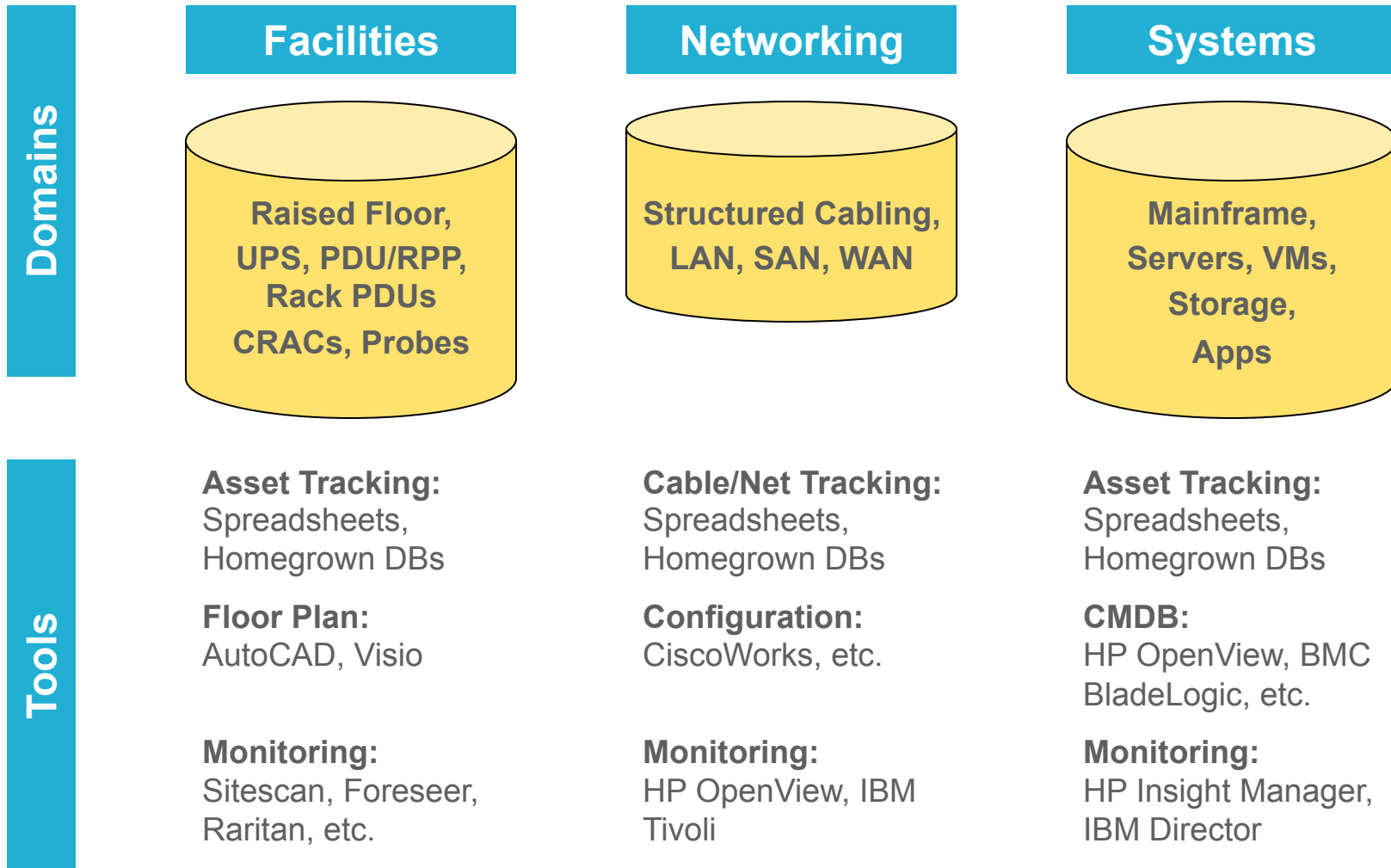
Multi-faceted Pain Points

Common Pain Points in Data Center Management

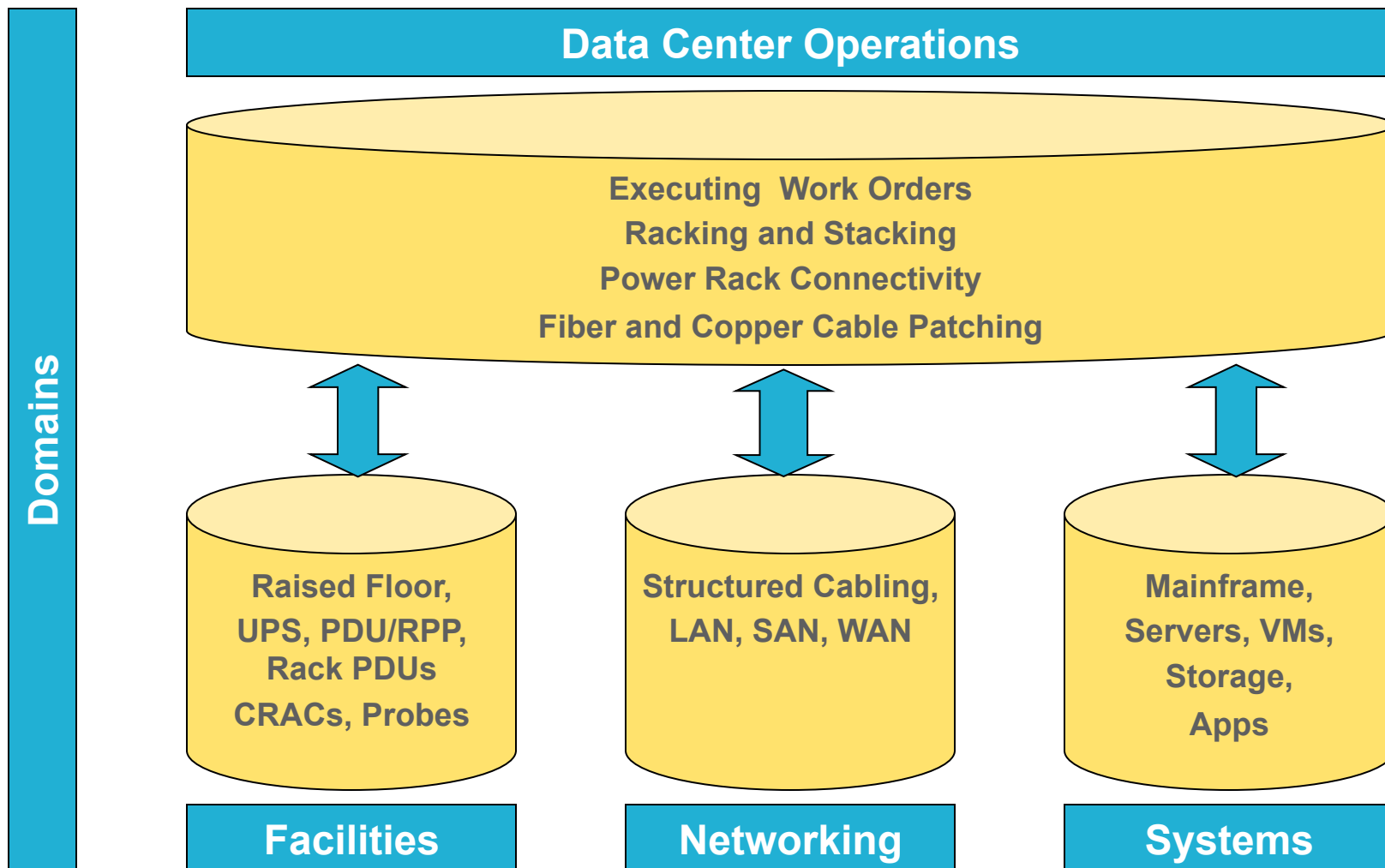
- ▶ Unable to **locate assets**
- ▶ Unable to **know what is connected to what** (manage relationships and dependencies)
- ▶ Unable to **find available resources** (rack space, power, cooling, network, IP addresses, etc)
- ▶ Unable to do accurate **capacity planning**
- ▶ Unable to **manage change** and enforce best practices and processes
- ▶ Unable to comply with **internal and external regulatory audits**



What Does an Enterprise Data Center Look Like?

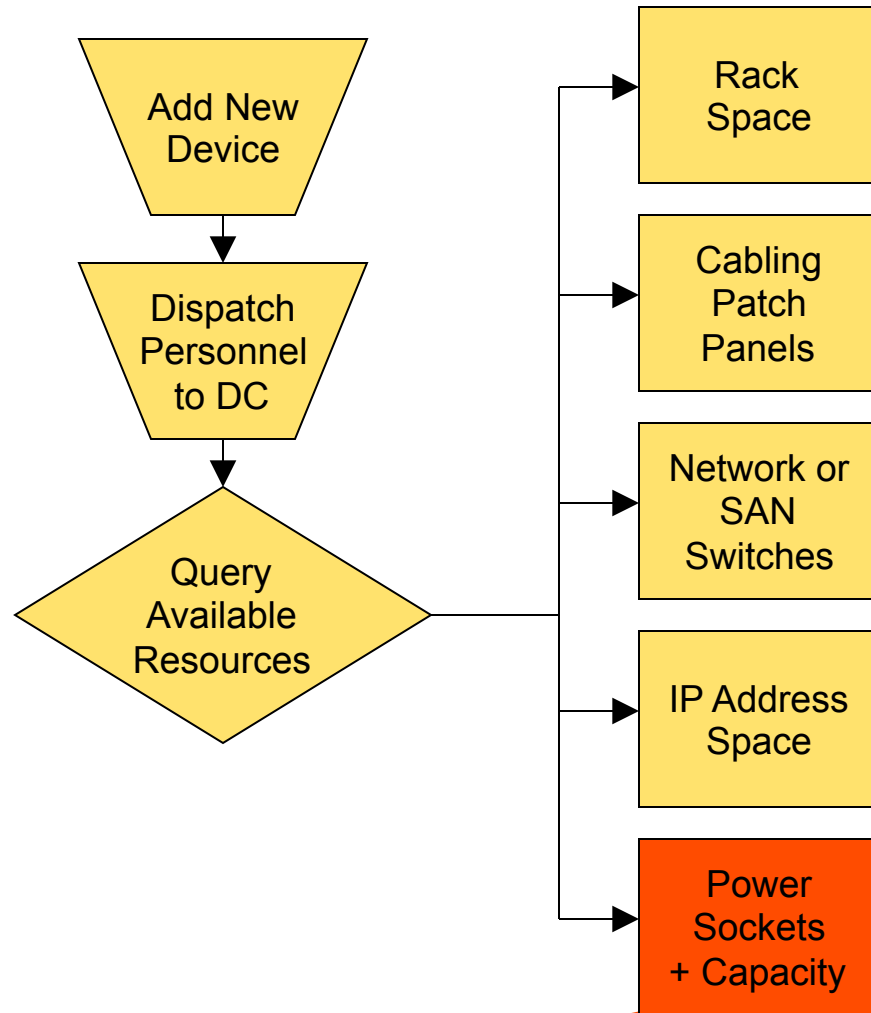
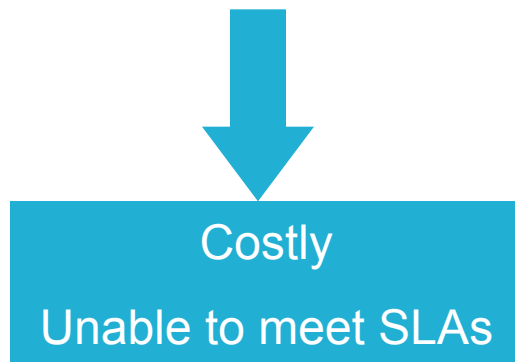


How is the Data Center Operations Model Evolving?



Manual Processes

- ▶ Labor-intensive processes
- ▶ Slow, time-consuming
- ▶ Unreliable
- ▶ Prone to conflict and errors



Problematic

Where is the Industry Heading?

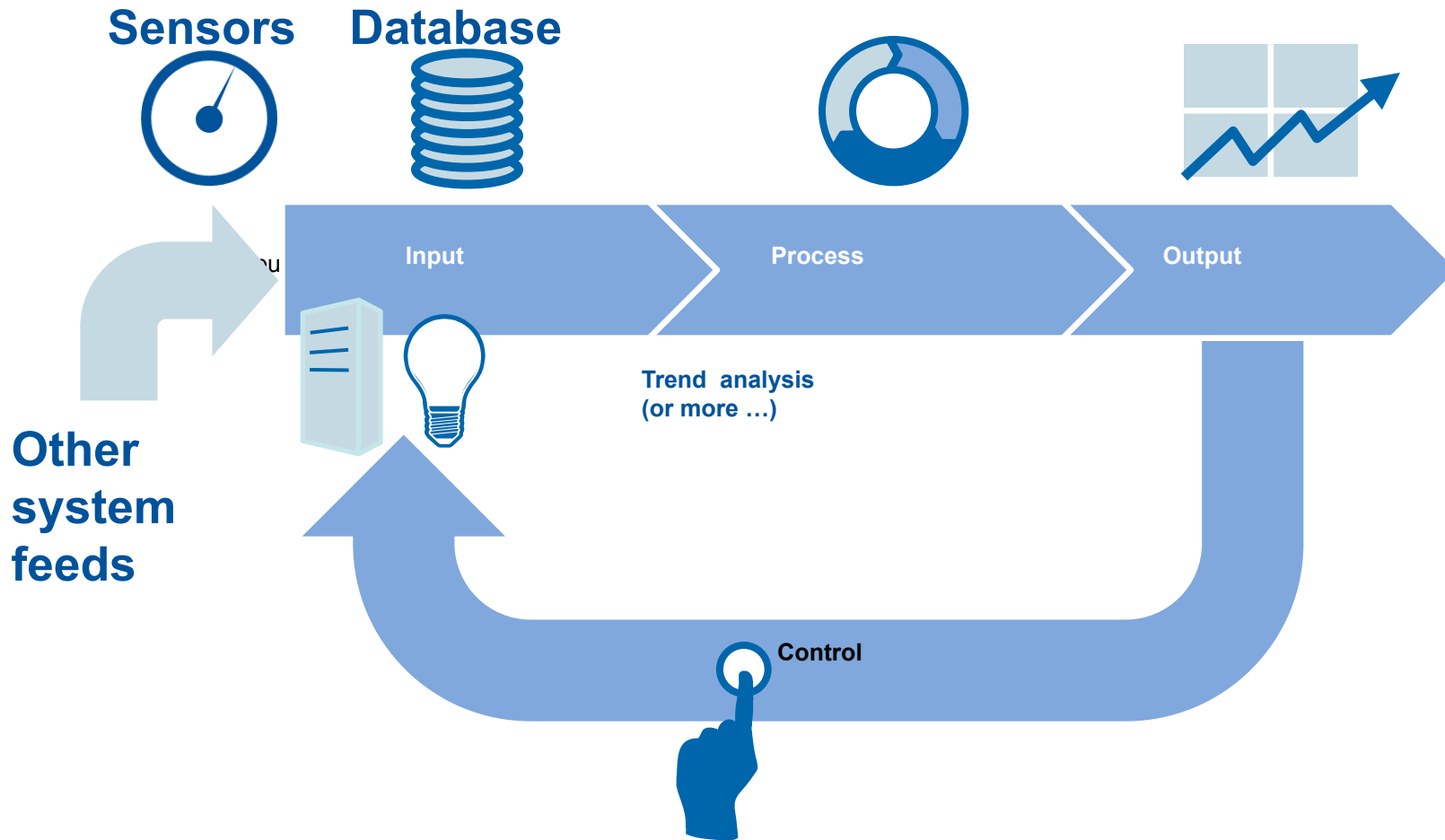
Gartner®

 IDC
Analyze the Future

FORRESTER®

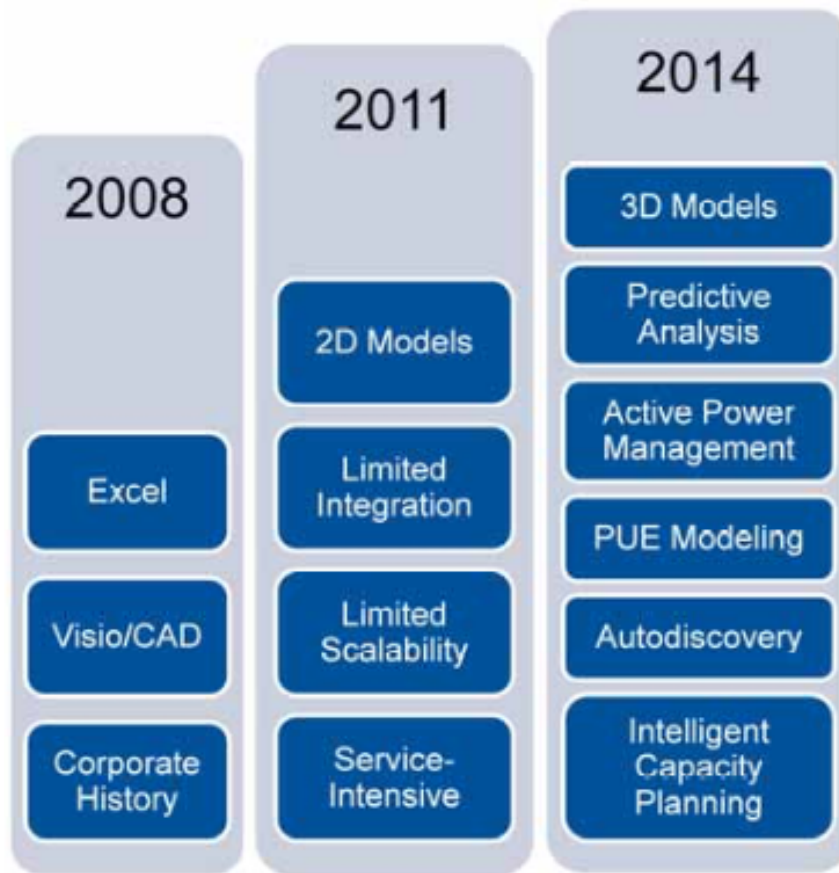
the 451 group

Gartner DCIM Model



Source: DCIM, New Tools to Monitor, Manage and control Power
Jay Pultz, Gartner Data Center Conference, December 2010

Gartner DCIM Model Evolution



- Optimize the energy utilization of assets
- Visualize the power consumption of resources
- Automate and control server energy usage to optimal levels
- Dynamically move workloads based on policy
- Shut down or power on resources
- Monitor and report consumption
- Use trending and capacity planning tools to manage resource usage proactively

**It's not about what you use —
but how you use it ...**

Gartner

Source: Extreme Data Centers
David Cappuccio, Gartner Data Center Conference 2010

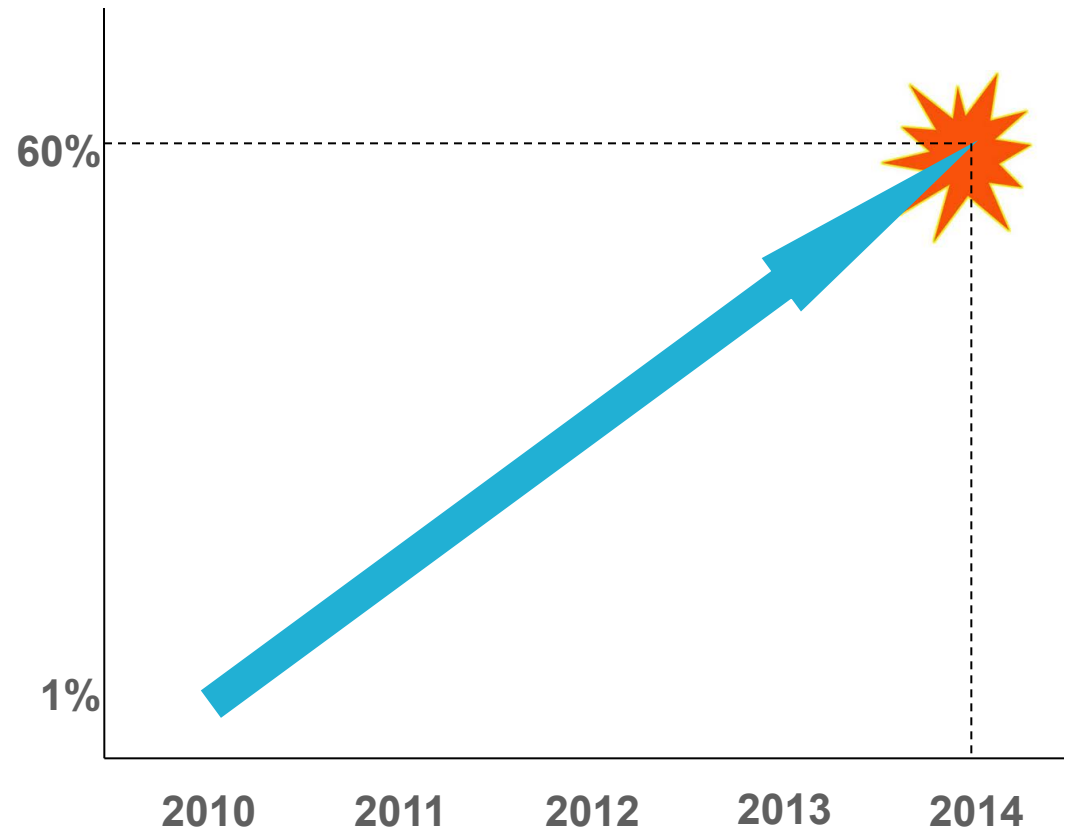
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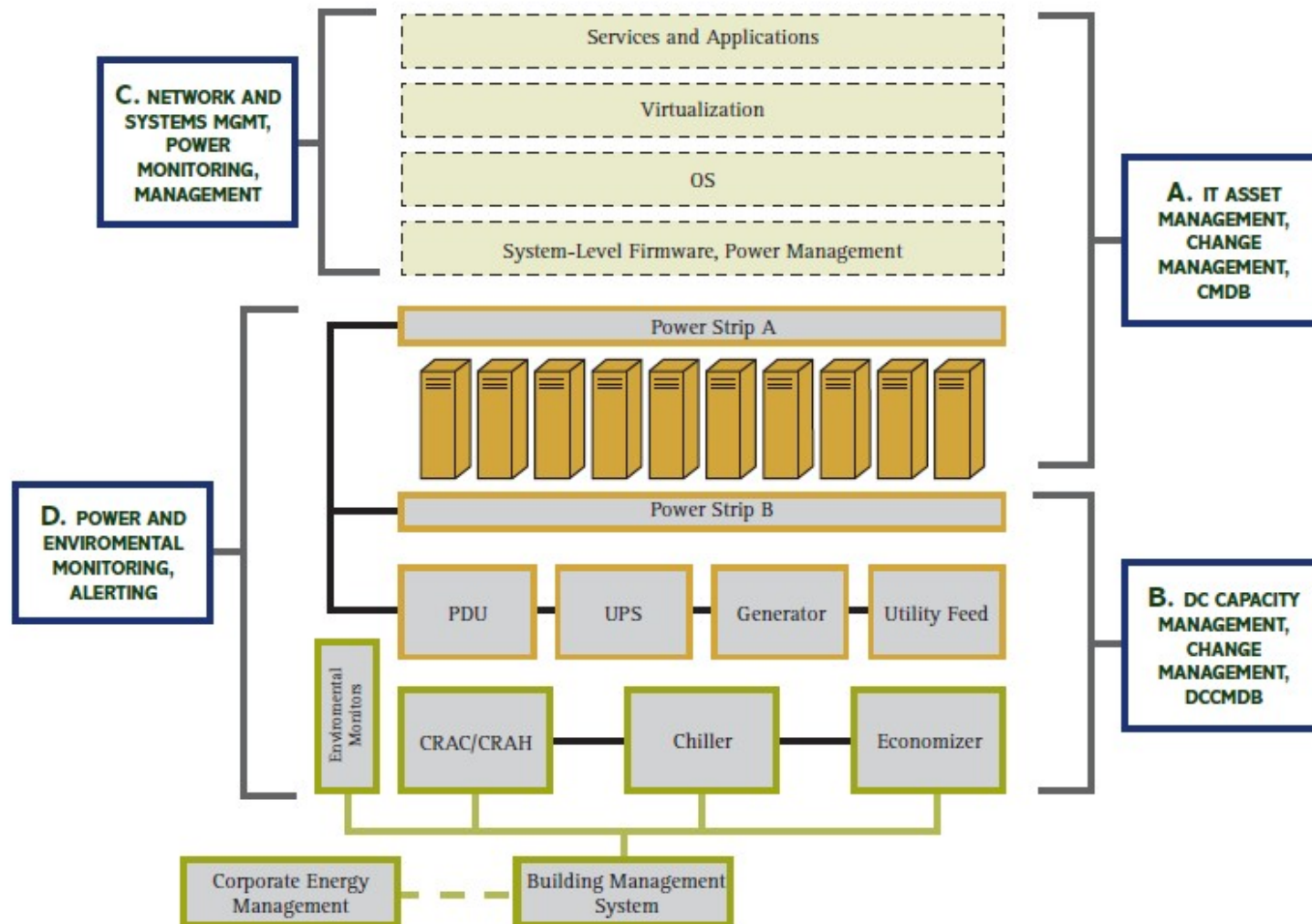
Gartner's Forecast

“DCIM tools and processes will become mainstream in data centers, growing from 1% penetration in 2010 to 60% in 2014.”

Source: Gartner Analysis Report by David Cappuccio, March 29, 2010



The 451Group DCIM Model

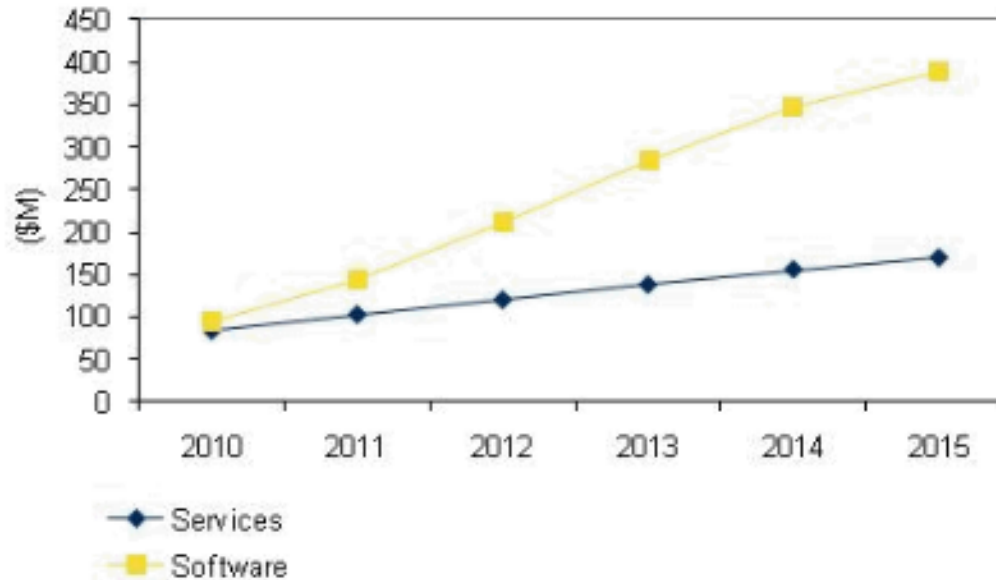


Source: 451 Group, Data Center Management & Energy-Efficiency Software Report, 2009

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IDC Research Report

Worldwide Datacenter Infrastructure Management Revenue by Services and Packaged Software, 2010–2015



Source: IDC, 2011

"DCIM will grow to shape datacenter facilities and IT operations for years to come. DCIM's combined software and services revenue will grow from \$179.4 million in 2010 to reach \$557.7 million by 2015."

Source: IDC, Katherine Broderick, Senior Research Analyst, 2011

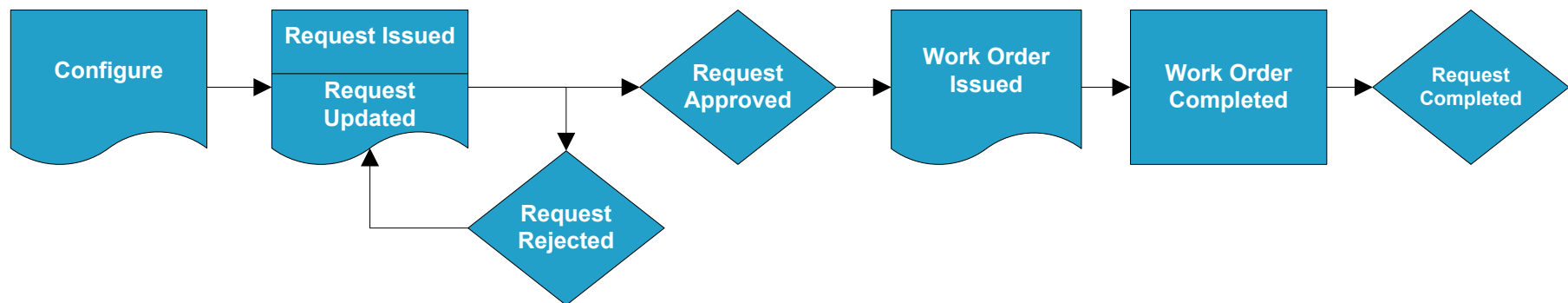
So What is Raritan's View of DCIM System?

- ▶ **Beyond Asset Tracking** Enable visualization, tracking and management of all data center assets and their related physical and logical resources including structured cable plant, networks, power infrastructure, and cooling
- ▶ **A Holistic Approach** Bridge the organizational and functional gaps across all domains including facilities, networking, and systems domains
- ▶ **A Single Pane of Glass** Used by all data center domains and groups regardless of hierarchy including managers, system administrators, and technicians
- ▶ **A Single Repository** A single database to house all data from across all data centers and sites
- ▶ **Process Driven** A change management system by which you can provision new systems and all their related physical and logical resources

A DCIM system becomes the gate through which you will enter the data center to affect physical changes

Built-in Provisioning Through Change Management

- ▶ Process-driven provisioning
- ▶ Capacity-based provisioning
- ▶ Work orders
- ▶ E-mail notifications



Raritan's Solution: Award-winning dcTrack®

dcTrack™



What Can dcTrack Do for Me?

▶ Asset Management

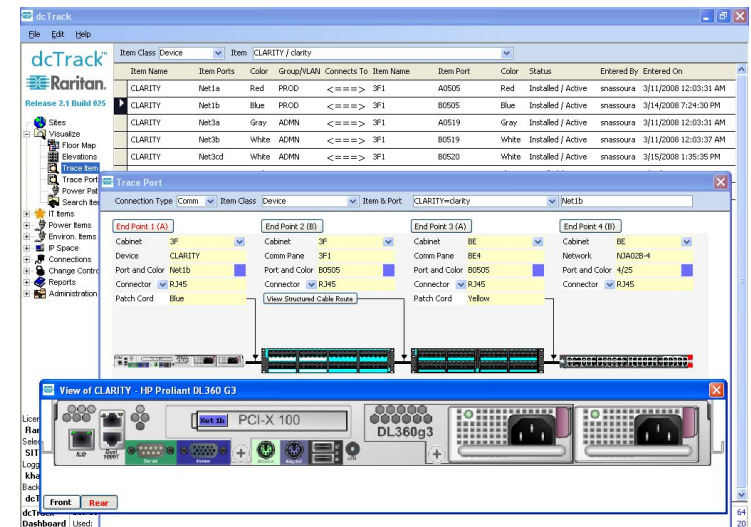
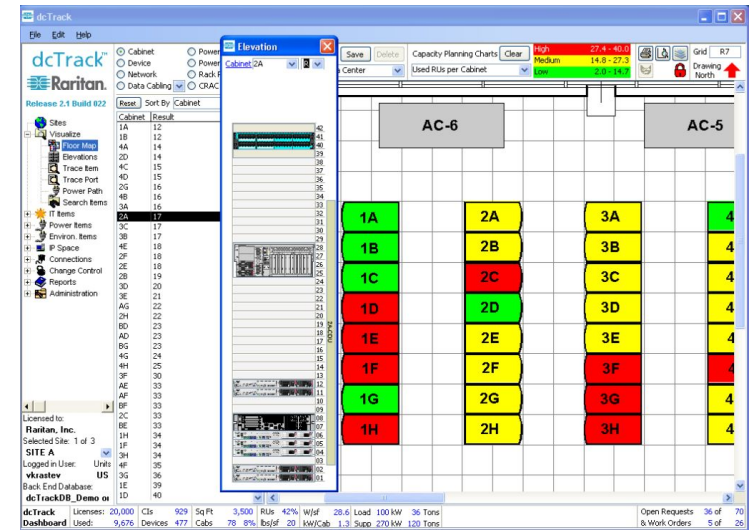
- ▶ What do I have
- ▶ How is it configured and connected
- ▶ Where is it located, who owns it
- ▶ What's the maintenance on it

▶ Capacity Management

- ▶ How much do space, power and network do I have
- ▶ Where do I have capacity
- ▶ How do I optimize my current capacity

▶ Change Management

- ▶ How do I manage moves, adds, and changes (MACs)
- ▶ Who does the work
- ▶ When is the work done
- ▶ How do I know it's done correctly



dcTrack Advantages

▶ Automation

- ▶ Automate provisioning process
- ▶ Automate capacity search
- ▶ Automate data collection

NEW

▶ Intelligence

- ▶ Add Intelligent asset tracking
- ▶ Integrate Intelligent power monitoring
- ▶ Embed Intelligent power provisioning

NEW

▶ Simplification

- ▶ Simplify software deployment
- ▶ Simplify implementation
- ▶ Simplify end-user interface
- ▶ Simplify procurement

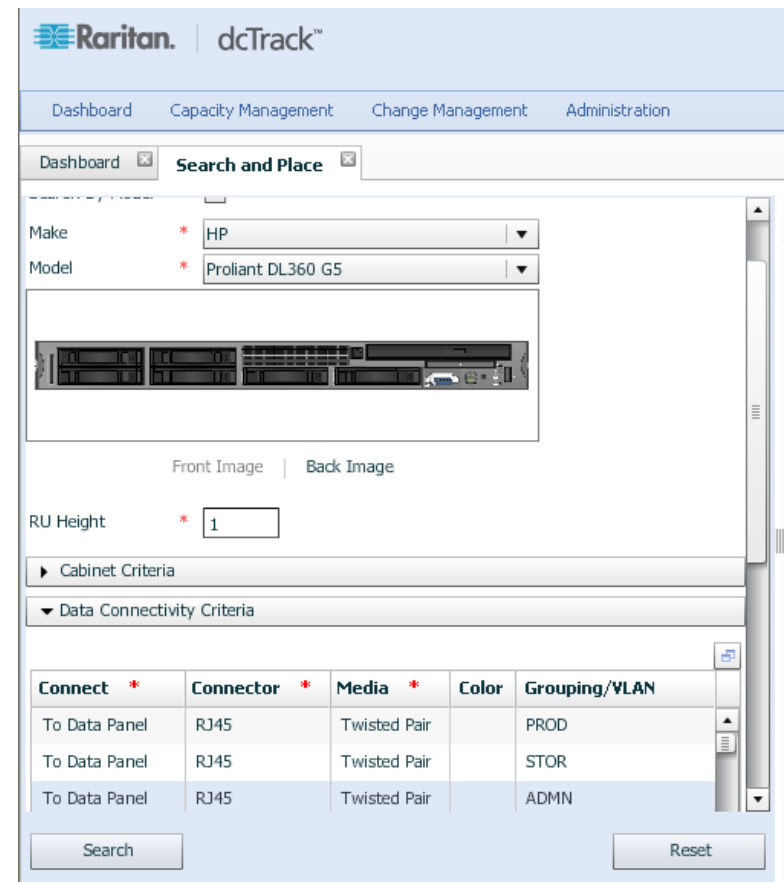


Automation



Automate Provisioning and Capacity Search

- ▶ **Provision** servers and configure with power supplies, network and SAN ports
- ▶ dcTrack will **automatically** recommend the best location based on multi-constraint criteria:
 - ▶ Contiguous rack space availability
 - ▶ Power Availability
 - ▶ Power Redundancy
 - ▶ Network and SAN switch port availability
 - ▶ Port VLAN, group, color-code availability



The screenshot displays the Raritan dcTrack web interface. At the top, the Raritan logo and 'dcTrack' are visible. Below the navigation bar (Dashboard, Capacity Management, Change Management, Administration), the 'Search and Place' tab is active. The 'Make' dropdown is set to 'HP' and the 'Model' dropdown is set to 'Proliant DL360 G5'. A front view image of the server is shown. Below the image, the 'RU Height' is set to '1'. There are expandable sections for 'Cabinet Criteria' and 'Data Connectivity Criteria'. The 'Data Connectivity Criteria' section contains a table with the following data:

Connect *	Connector *	Media *	Color	Grouping/VLAN
To Data Panel	RJ45	Twisted Pair		PROD
To Data Panel	RJ45	Twisted Pair		STOR
To Data Panel	RJ45	Twisted Pair		ADMN

At the bottom of the form, there are 'Search' and 'Reset' buttons.

Automate Provisioning and Capacity Search


Raritan. | dcTrack™

Dashboard Capacity Management Change Management Administration

Dashboard Search and Place

Make * HP

Model * Proliant DL360 G4p Provision Server



Front Image | Back Image

RU Height * 1 Select Cabinet Criteria

▼ Cabinet Criteria

Grouping Mail

Type

Function

▼ Data Connectivity Criteria

Connect *	Connector *	Media *	Color	Grouping/WLAN
To Data Panel	RJ45	Twisted Pair		PROD
To Data Panel	RJ45	Twisted Pair		STOR
To Data Panel	RJ45	Twisted Pair		ADMN

Name	U Position	Available RUs	Contiguous RUs

Search Reset Reserve... Place...

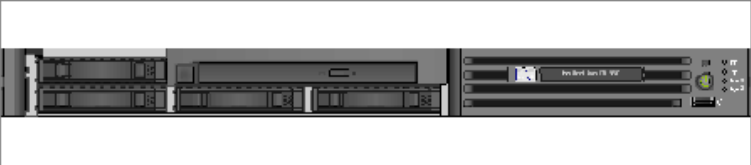
Automate Provisioning and Capacity Search

Raritan | dcTrack™

Dashboard Capacity Management Change Management Administration

Dashboard Search and Place

Model * Proliant DL360 G4p



Front Image | Back Image

RU Height * 1

- ▶ Cabinet Criteria
- ▶ Data Connectivity Criteria
- ▼ Power Connectivity Criteria

Basic | Per Port Options

Quantity 2 Redundancy * N+1

Name Plate * 535 Watts

Budget * 300 Watts

Phase * Single Phase (3-Wire)

Voltage * 120~240

Connector * IEC-320-C14

Search Reset Reserve... Place...

Search Results

Location	Cabinet Name	U Position	Available RUs	Contiguous RUs

Select Power

Automate Provisioning and Capacity Search

The screenshot displays the Raritan dcTrack web interface. The top navigation bar includes 'Dashboard', 'Capacity Management', 'Change Management', and 'Administration'. The main content area is titled 'Search and Place'. On the left, search filters are set: 'Select Location' is 'SITE A', 'Search By Model' is checked, 'Make' is 'HP', and 'Model' is 'Proliant DL360 G4p'. Below these is a server image and 'RU Height' is set to '1'. On the right, the 'Search Results' table shows four entries for 'SITE A' with various cabinet names and U positions. At the bottom, there are 'Search', 'Reset', 'Reserve...', and 'Place...' buttons. Three blue callout boxes provide instructions: 'Find all matching cabinets' points to the search results table, 'Search for best location' points to the 'Search' button, and 'Place the server in cabinet now or Reserve space for future use' points to the 'Reserve...' and 'Place...' buttons.

Find all matching cabinets

Search for best location

Place the server in cabinet now or Reserve space for future use

Location	Cabinet Name	U Position	Available RUs	Contiguous RUs	Group
SITE A	2B	16	23	23	Mail
SITE A	2D	12	28	27	Mail
SITE A	2H	20	20	19	Mail
SITE A	3D	17	22	13	Mail

Auto Discovery of Devices



Release 2.5.0

- Sites
- Visualize
- IT Items
- Power Items
- Environ. Items
- IP Space
 - Subnets
 - Addresses
 - DNS Audit
 - Discovery
 - Lookup & Ping
 - SNMP VWalk
- Connections
- Change Control
- Reports
- Administration

STEP 1: Select an IP Address Range and click Start to begin discovering SNMP-enabled Items

Select IP Address Range to Scan

- All Defined Subnets
- Selected Subnets

Subnet Start	Subnet End	Mask	FullName
10.1.0.0	10.1.3.255	/22	PROD Row 1
10.1.4.0	10.1.7.255	/22	PROD Row 2
			PROD Row 3
			PROD Row 4
			PROD Row 1
			PROD Row 2
			PROD Row 3
			PROD Row 4
10.3.0.0	10.3.3.255	/22	ADMN Row 1
10.3.4.0	10.3.7.255	/22	ADMN Row 2
10.3.8.0	10.3.11.255	/22	ADMN Row 3
10.3.12.0	10.3.15.255	/22	ADMN Row 4
10.11.0.0	10.11.3.255	/22	ADMN Row 1

Auto Discovery of IP Devices

Standard RFC 1213 MIB

SNMP Options

SNMP UDP Port:

SNMP Read Community:

SNMP Timeout: Seconds

SNMP Version:

Scan Options

The scan has 5 steps, each scanning and parsing different portions of the MIB for all discovered systems. Auto Scan completes all steps without user intervention.

- Auto Scan
- Manual Scan
- Skip to Previously Discovered Systems

Steps to Include in Scan

- Step 2: Network Interfaces
- Step 3: System Resources
- Step 4: Installed Software

SNMP Auto Discovery uses standards based MIBs. RFC 1213 MIB (.1.3.6.1.2.1) and Host Resources MIB (.1.3.6.1.2.1.25) are used to collect the following information:

- System Name, Description, etc.
- System Network Interfaces (Ports)
- System RAM and Virtual Memory
- Disk Storage capacity and percent used.
- Brand and number of processors
- Installed Software and Installation Date

Click Start to begin

SNMP Packets Sent 0, Received 0

Response Detail of Selected Packet

OID	Value

OID	Value

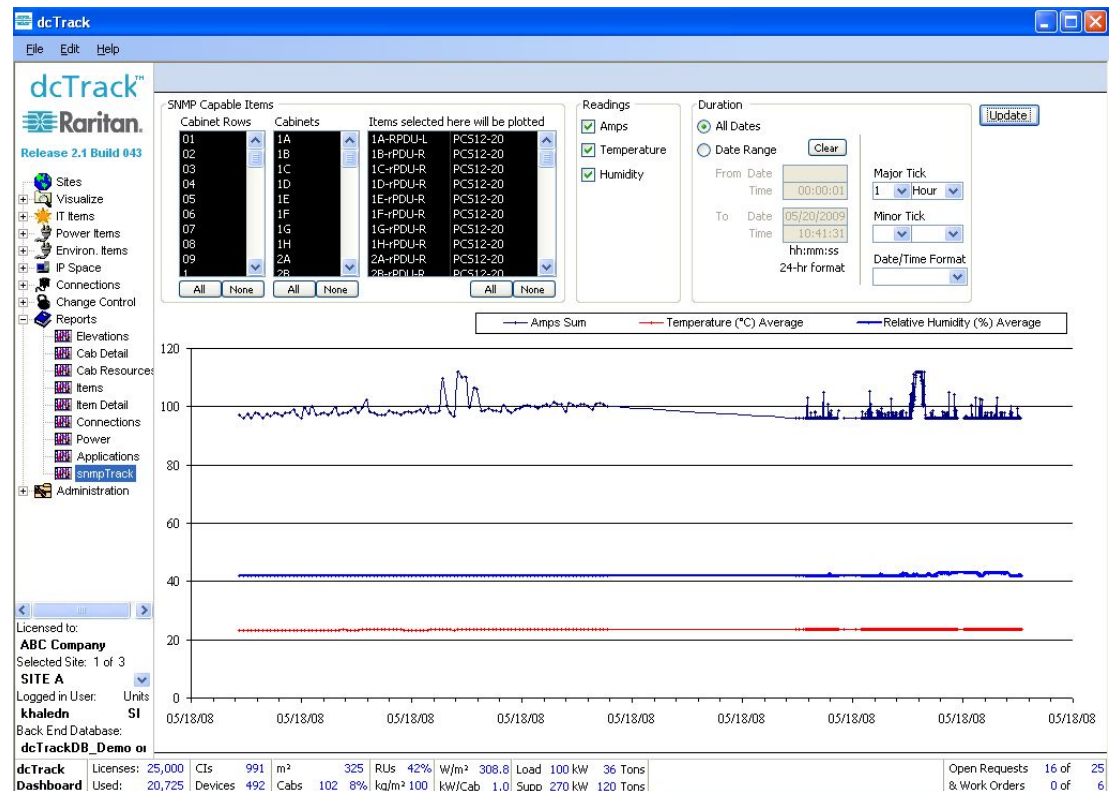
icensed to:

Real-Time Reporting to Manage Energy

- ▶ Monitor Power Consumption in Real-time at the Device Level



- ▶ Eliminate “Ghost” Servers
- ▶ Refresh Energy Inefficient Servers
- ▶ Target Servers for Virtualization

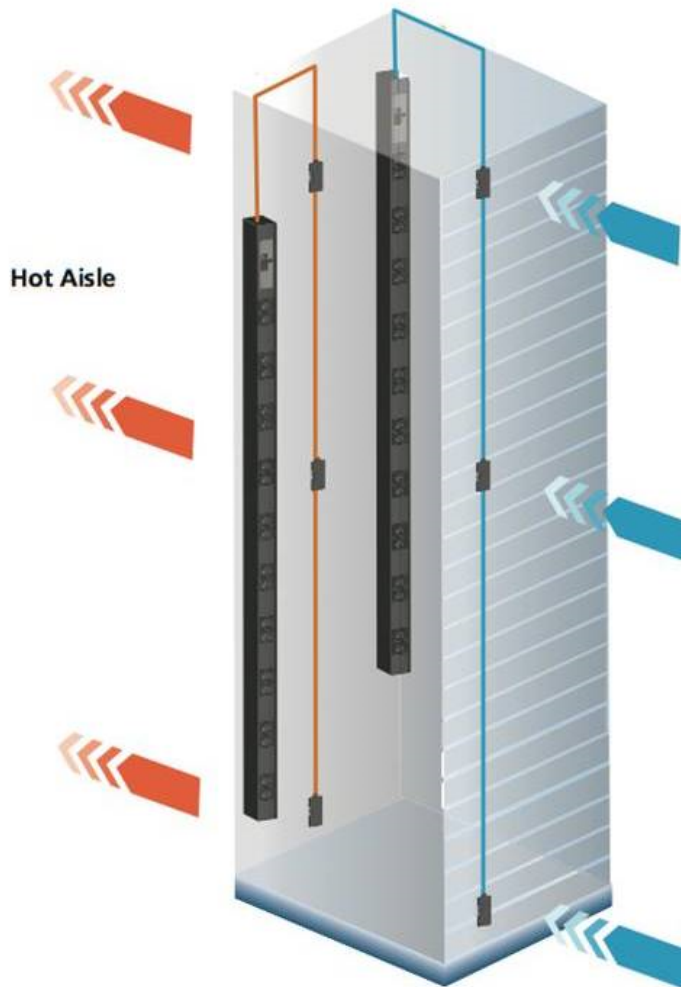




Intelligent Asset Management System

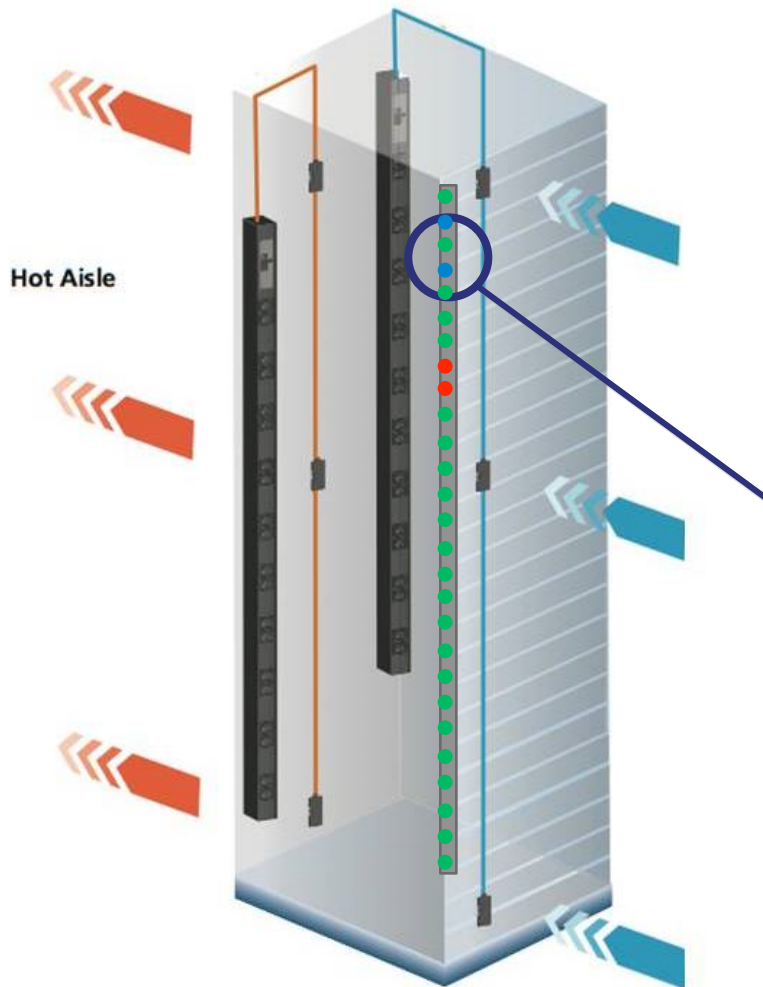


Intelligent Asset Management System



The Cabinet:
The last “dumb” data center
component is about to
get ‘smarter”

Intelligent Asset Management System



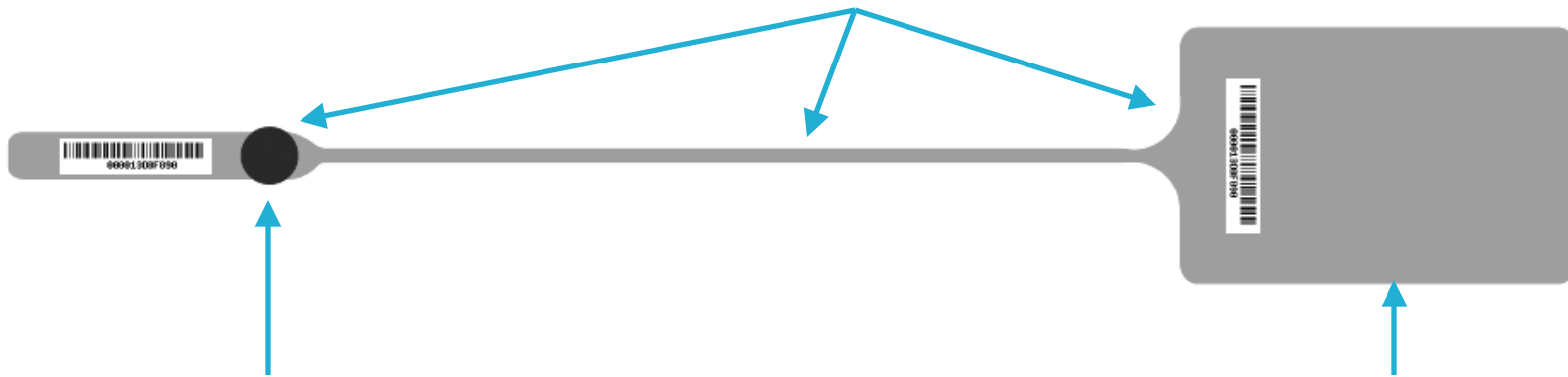
- ▶ Locate assets with precision: rack + U position
- ▶ Color LEDs at each U-space: verifies connection and shows state
- ▶ Integrate with dcTrack change control



How it Works: Intelligent Asset Tag

Entire tag fabricated from **extremely-durable plastic sheathing**.

Flexible, yet durable interconnect.

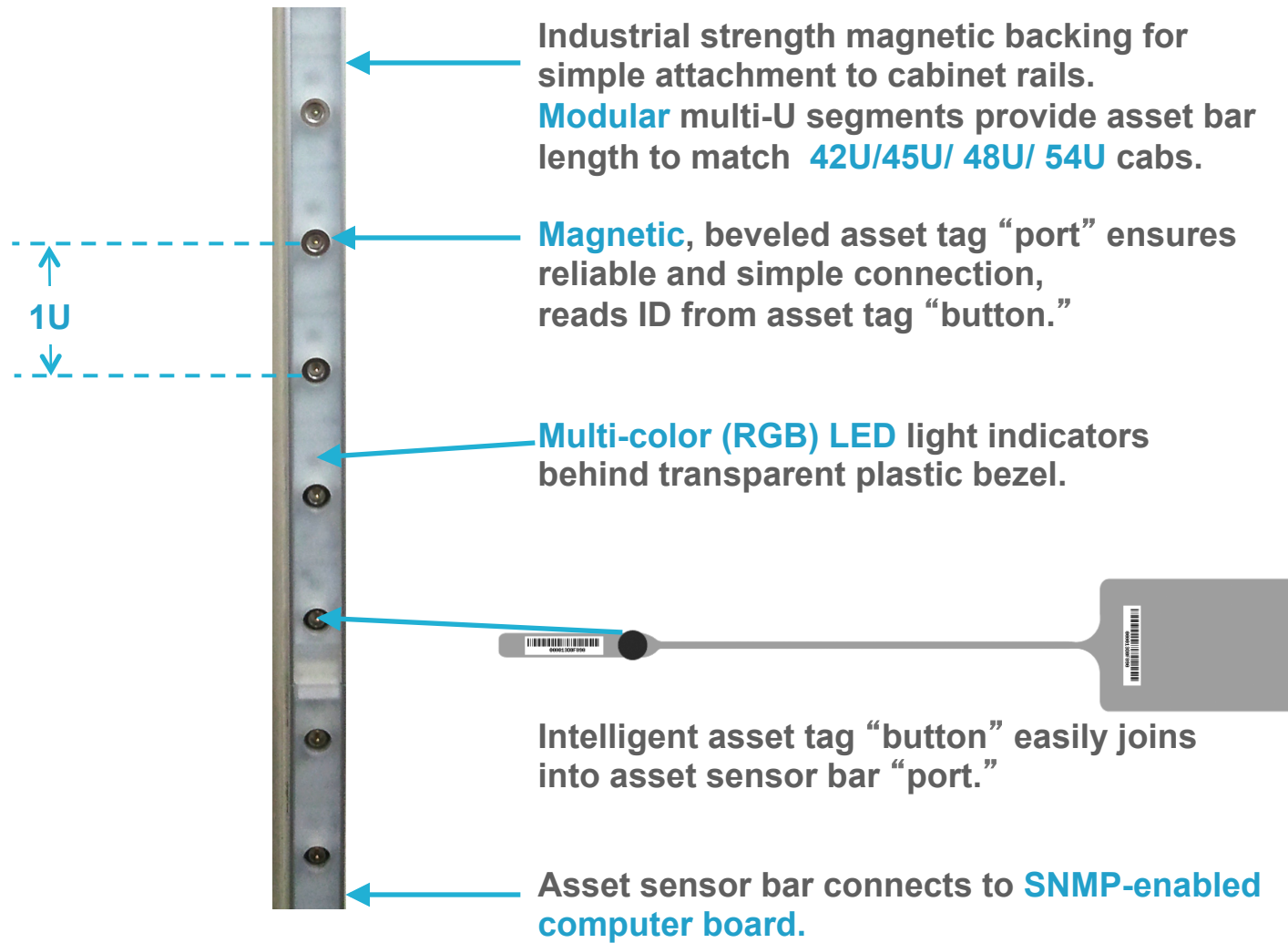


Magnetic "button" contains **chip with asset tag ID** (identical to barcode).

Industrial-strength adhesive joins main **asset tag** body to top/bottom of device.

Magnetic "button" easily snaps in asset sensor bar RU port.

How it Works: Intelligent Asset Sensor Bar



How it Works: SNMP-enabled Computer Boards

Two Choices



EMX Serial Consolidator

- 1U 8-port Unit
- WiFi (802.11 a/b/g/n) or Wired Ethernet;
- Supports 8 Intelligent Asset Sensor Bars
- Also supports environmental monitoring probes (temp + humidity)
- **SNMP communications with dcTrack**



Intelligent Rack PDU PX Series

- Sensor bar connects to PX serial port
- PX supports wired Ethernet or WiFi
- **SNMP communications with dcTrack**

Integration with dcTrack 2.6

▶ Add New Device

- ▷ Build and configure new device in dcTrack
- ▷ Attach “Intelligent Asset Tag” to device
- ▷ Generate Work Order
- ▷ Intelligent Asset Sensor Bar LED blinks “Blue” at the destination RU port
- ▷ Install new device in cabinet
- ▷ Intelligent Asset Sensor Bar LED turns “Green” at the destination RU port
- ▷ Confirmation is received by dcTrack that new device with the correct asset tag is installed in the correct cabinet and RU position

▶ Remove Device

- ▷ Request device move in dcTrack
- ▷ Generate Work Order
- ▷ Intelligent Asset Sensor Bar LED blinks “Blue” at the destination RU port
- ▷ Remove Device
- ▷ Intelligent Asset Sensor Bar LED turns “White” at the destination RU port
- ▷ Confirmation is received by dcTrack

Integration with dcTrack 2.6

▶ Unauthorized Changes

- ▶ Device is either installed in an incorrect RU position; or
- ▶ Device is removed from cabinet without a Work Order
- ▶ Intelligent Asset Sensor Bar LED blinks “Red” at the destination RU port
- ▶ SNMP trap is received by dcTrack



dcTrack: Simplicity by Design



dcTrack: Simple to Procure

▶ Simple licensing model

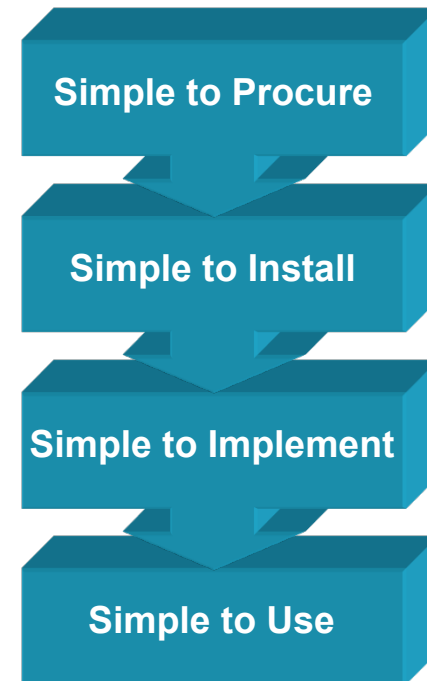
- ▶ Perpetual software license
- ▶ Based on number of cabinets
- ▶ Pay as you go
- ▶ Unlimited sites, devices, users

▶ Sliding scale pricing

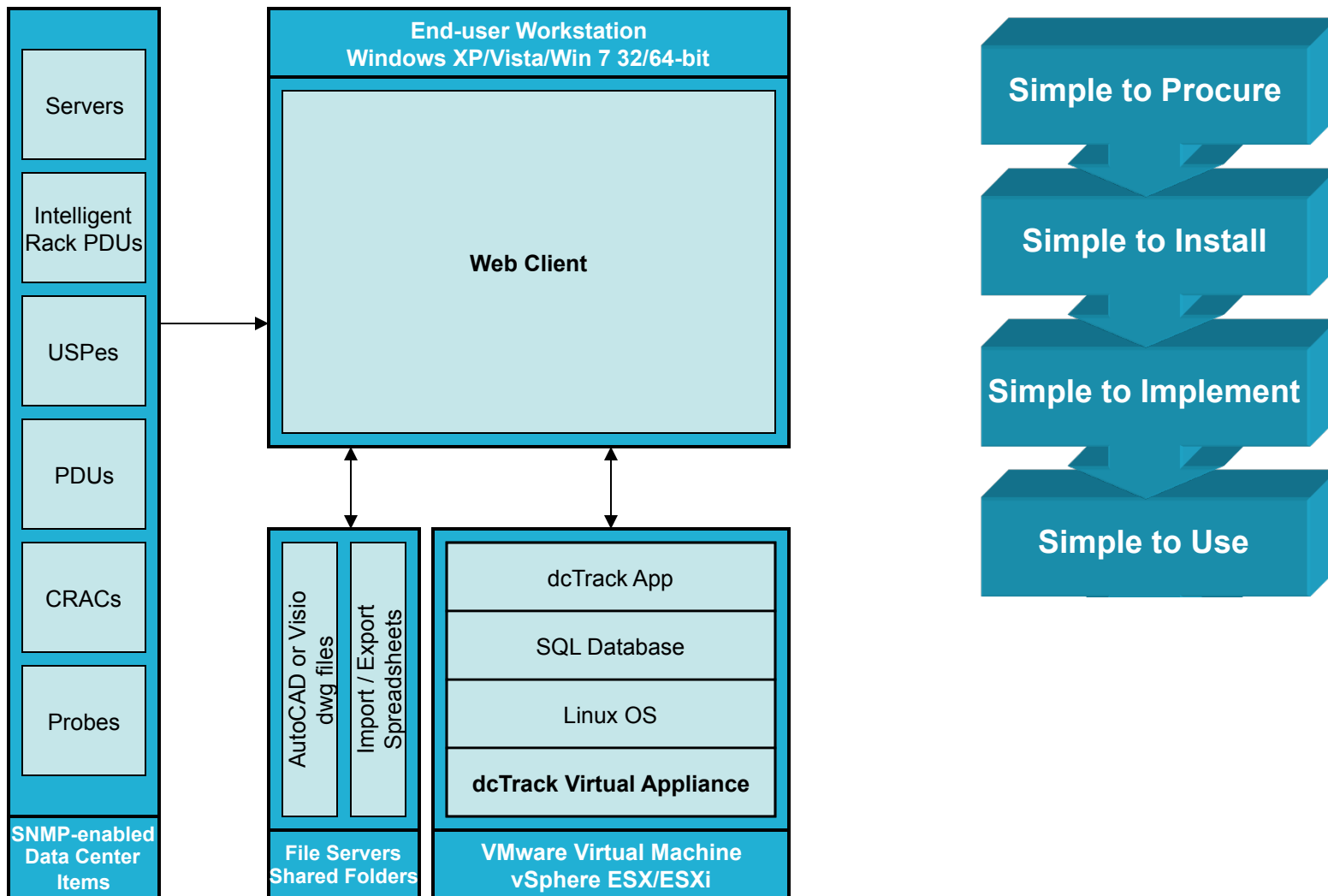
- ▶ Starts at \$525/cab for 25 cabs
- ▶ Drops to \$360/cab for 2,000 cabs

▶ Easy to order

- ▶ Single part number for software license and 1st year maintenance bundle
- ▶ 18% annual maintenance



dcTrack: Simple Architecture



dcTrack: Simple to Implement

▶ Well Documented Process

- ▶ Implementation and User Guides
- ▶ In depth online training videos

▶ Quick Start Services

- ▶ If help is needed to jump start
- ▶ Pre-defined SOW

▶ Turnkey Implementation

- ▶ Delivered by trained and certified partners
- ▶ Customized SOW

▶ Tools

- ▶ Import Wizards
- ▶ Auto Discovery
- ▶ Auto linking to existing floor plans



dcTrack™ 2.4 Implementation Guide

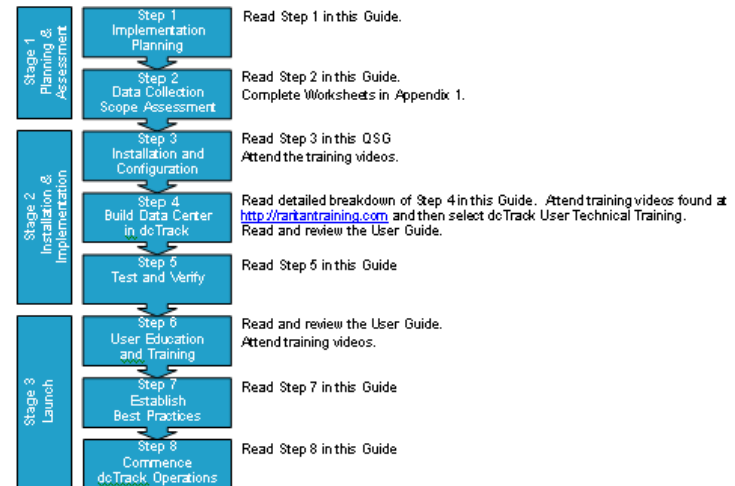
Purpose

The purpose of this Guide is to assist customers and Solution/Implementation Partners to successfully install, deploy and implement dcTrack version 2.4.x in customer environments. The Implementation Guide does not contain detailed, step-by-step instructions, but rather a roadmap and a guide to the implementation process, which refers to other documents that contain the detailed instructions. The Guide ties together the existing resources, as well as organizes the implementation process into a logical series of steps to support a successful implementation.

High Level Implementation Process Flow

This Guide is organized into 8 steps as described in the process flow diagram below. These steps are grouped in three logical stages as follows:

1. Stage 1: Planning and Assessment. The implementation is planned and the scope of the implementation is defined.
2. Stage 2: Installation and Implementation. The dcTrack application and database server are installed and the initial data is collected, organized and imported into dcTrack.
3. Stage 3: Launch. dcTrack is launched as an operational system for data center infrastructure management.



Supporting Documentation

1. dcTrack Quick Setup Guide (QSG) found at <http://ftp.dctrack.com/dcTrack 2.4 Installation Files/>.
2. dcTrack User Guide (User Guide) found at <http://ftp.dctrack.com/dcTrack 2.4 Installation Files/>.
3. dcTrack Technical Training Videos, <http://raritantraining.com> and then select dcTrack User Technical Training.
4. Import and Documentation Templates found at <http://ftp.dctrack.com/dcTrack Implementation/>.

dcTrack: Simple to Use

▶ Easy to Navigate GUI

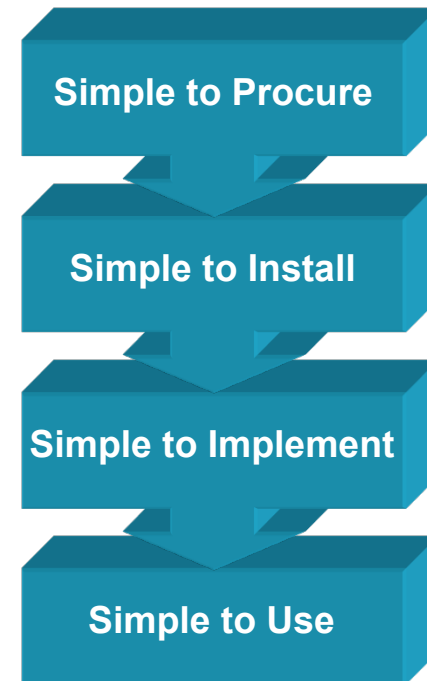
- ▶ Intuitive layout
- ▶ Explorer-style menu
- ▶ Always visible dashboard

▶ Operator-optimized Screens

- ▶ No cascading screens and pop-ups to perform a single task
- ▶ All item-related information is one screen

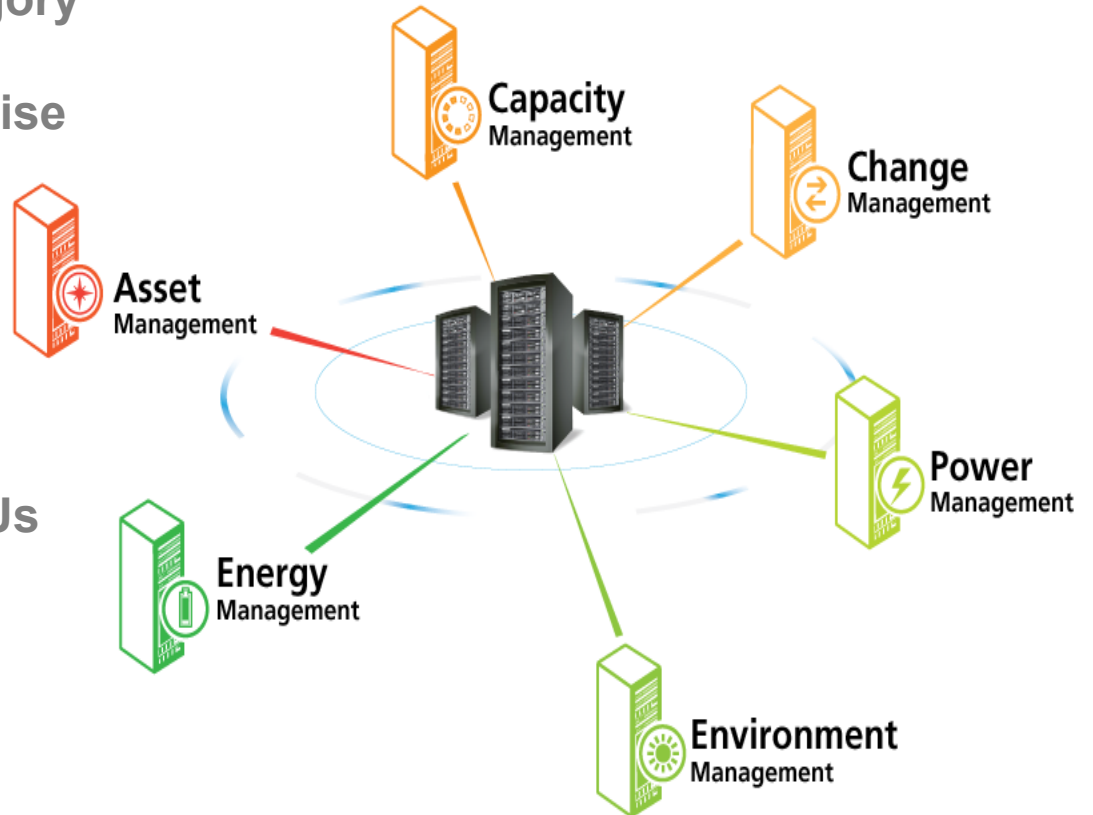
▶ Import Wizards

- ▶ Import any tabular spreadsheet
- ▶ Map any spreadsheet column to any dcTrack field
- ▶ Error-checking and data validation



Raritan is Well Positioned to Respond to Customer Needs

- ▶ Early Leader in DCIM Category
- ▶ Data Center Domain Expertise
- ▶ Leading Provider of Data Center KVM and Remote Access
- ▶ Leading Provider of Data Center Intelligent Rack PDUs





Questions and Answers

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dcTrack.com