The Next Trend?

IEEE Music City Power Quality Meeting - Central Tennessee Section

August 14, 2013 - Mark Welsko, P.E. - Director , Mission Critical Design

...balancing the environment with availability

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WES Contact Information

WES Provides services worldwide. Please contact for assistance in any geographical area.

Americas Offices
Phone: 1-215-619-0980
Fax: 1-215-619-0990
General Email: email@wes.net

Mailing Address:
P.O. Box 1541
Blue Bell, Pennsylvania, 19422-0440 USA

WES Background

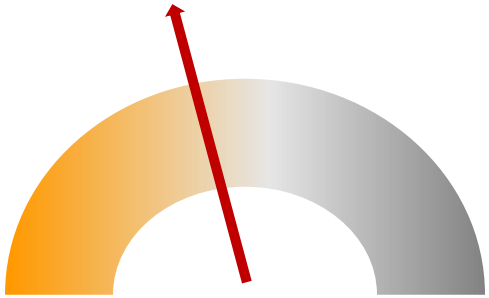
- Over 30 Years Experience in DC Industry with several thousand engagements performed in over 40 countries.
  - Assessment & Inspection
  - Monitoring & Support
  - Mission Critical Design
  - Decontamination & Remediation
  - Training & Certification

- Corporate Philosophy
  - Optimize Existing
  - Design New to Minimize Costs & Maximize Availability

Thoughts of the Moment

- What is DCIM?
- Is it wrong with how it's done today?
- What Drivers Change it for tomorrow?

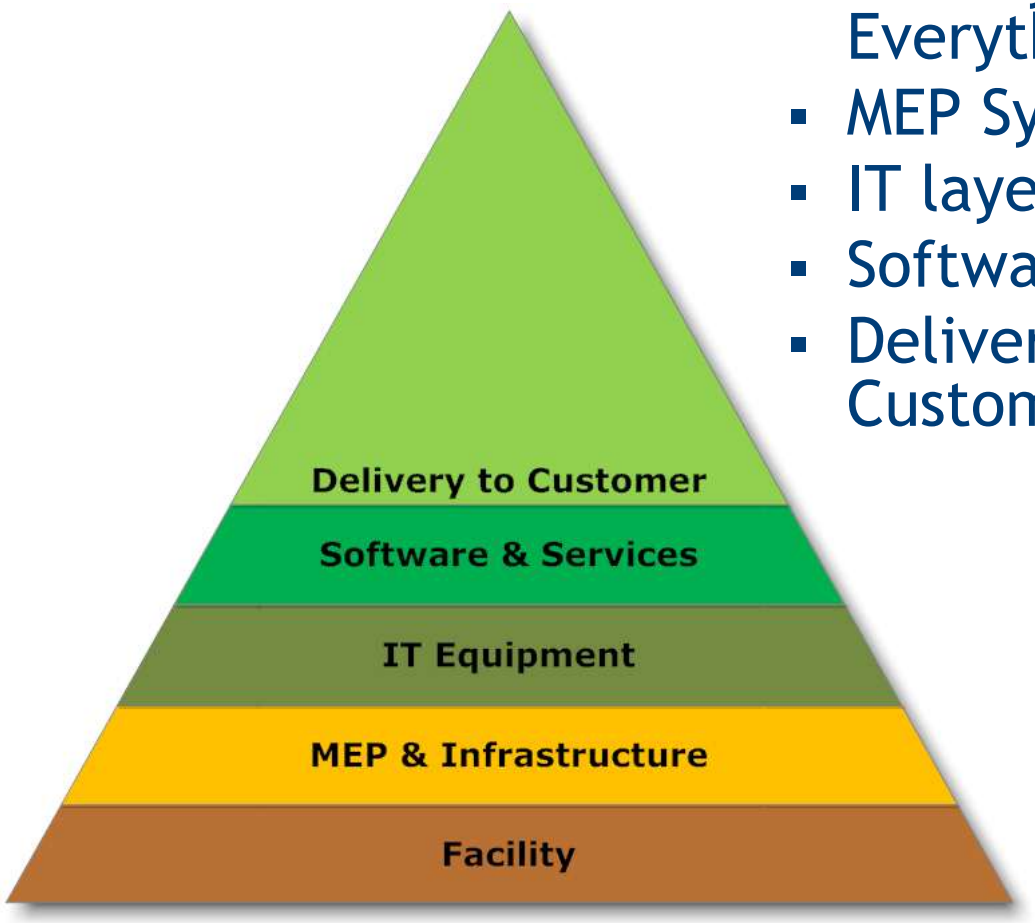
Primary Purpose of Data Center



Organizationally Defined Blended Purpose

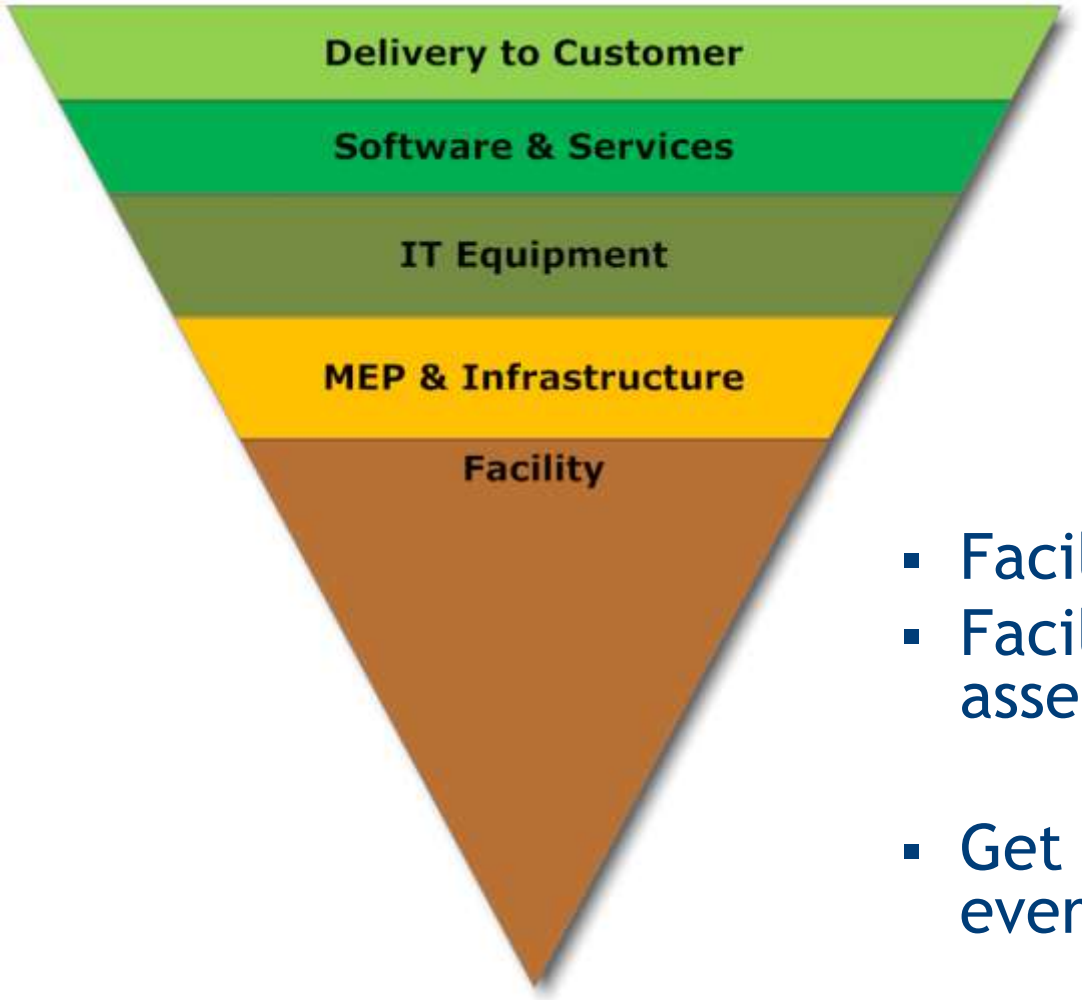
- Information Assets - Access/Protection
- Provide Revenue (Direct/Indirect)

Traditional Data Center Support Model



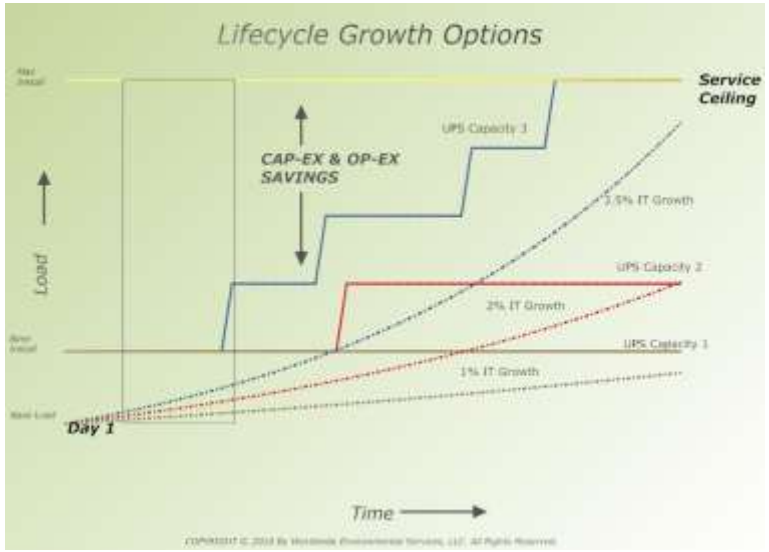
- Facility is the Base for Everything
- MEP Systems Layer on facility
- IT layers on MEP
- Software/Services layers on IT
- Delivery of Services to Customer

Flipped Model - Financial Impact



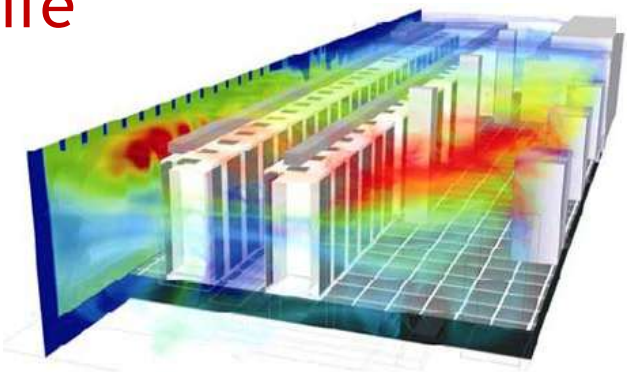
- Facility is the Base
- Facility is the least cost asset
- Get it Wrong and everything falls over fast.

Static Designs needs to move to Living Environments



- Calculations are based upon full load characteristics.
- Cooling is evaluated for a point in time at design conditions.
- Life Cycle estimates look at full utilization.
- Efficiency against deployment is often neglected.

Most DC's Designed for End of Life



Trends Over Time

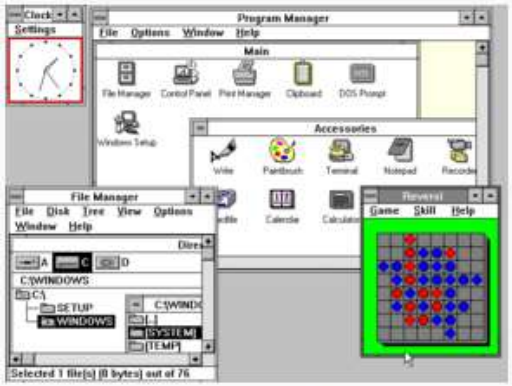
DCIM has always been with us – the tools are maturing

- ✓ Density and Air Cooling – Circa 1992
- ✓ Multi Vendor Servers – Circa 1996
- ✓ 5 Nines – Drive to Always On – Circa 2000
- ✓ High Density – Circa 2004
- ✓ PUE and Energy is King – Circa 2008
- ✓ Automation meets DCIM – Circa 2012

Need → Market → Discussion

Technology 20+ Years Ago

- AMD introduces the AM386 microprocessor family in March, Intel i486SX in April.
- Symantec first release of Norton anti-virus software.
- The domain microsoft.com comes online May 2, 1991.
- MS-DOS 5.0 was released.
- Broadband did not exist.
- PCs had 20-40MB Hard Drives. Data Centers had 500MB of storage.
- Founders of Google would not meet for 4 more years.
- Mainframes Ruled the Whitespace



Screenshot of Windows 3.0

Data Center Management – Circa 1990

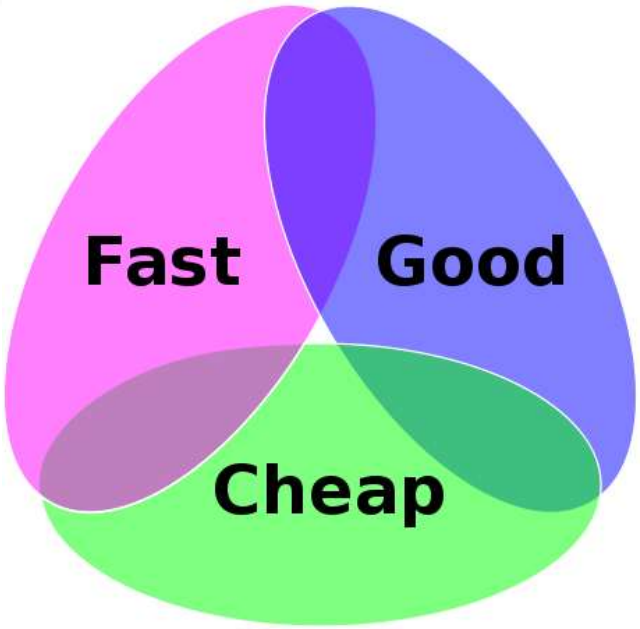
- Single Vendor
- Low Changeover
- Lower Density
- Vendor Furnished Equipment cabinets

Industry spent the 90's rebuilding for the server environment, and the early 2000's trying to fill the overbuilt environment.

Business Demands Outpace Facilities

18-24 Months to deliver me a Data Center, We need it . .

- Flexible
- Faster
- Cheaper
- Better



Can we have it all? Does the old adage of "pick any two" Still apply?

Today's Data Center Pressures

- Designed to be concurrently maintainable with high availability.
- Capital Efficient
- Designed for Flexibility/Growth
- Designed for Scalability
- Incorporates ECO elements
- Simplify New IT technology deployment – Big Data, unknown future.
- CAPEX/OPEX Struggle.

Meet the Needs

- Facility should not limit Business
- Racks counts can grow independent of Core Services
- KW & BTUh capacity can be delivered where it is needed when it is needed, avoid stranded capacity without increase in risk.
- Facility may have different availability requirements by area.

Technology Evolution

HP Moonshot System

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Compared to traditional servers, up to:

89% less energy * **80%** less space * **77%** less cost ** **97%** less complex *

Speed, Scale and Specialization

The HP Moonshot System is like nothing else that exists today. It's a huge leap forward in infrastructure design that addresses the speed, scale, and specialization needed for a "New Style of IT."

HP Moonshot web servers are designed and tailored for specific workloads to deliver optimum performance. These low power servers share management, power, cooling, networking, and storage. This architecture is key to achieving 8x efficiency at scale*, and enabling 3x faster innovation cycle.

View products

"With nearly 10 billion devices connected to the internet and predictions for exponential growth, we've reached a point where the space, power, and cost demands of traditional technology are no longer sustainable. HP Moonshot marks the beginning of a new style of IT that will change the infrastructure economics and lay the foundation for the next 20 billion devices."

Meg Whitman
President and CEO, HP

Mainframe

↓

Server

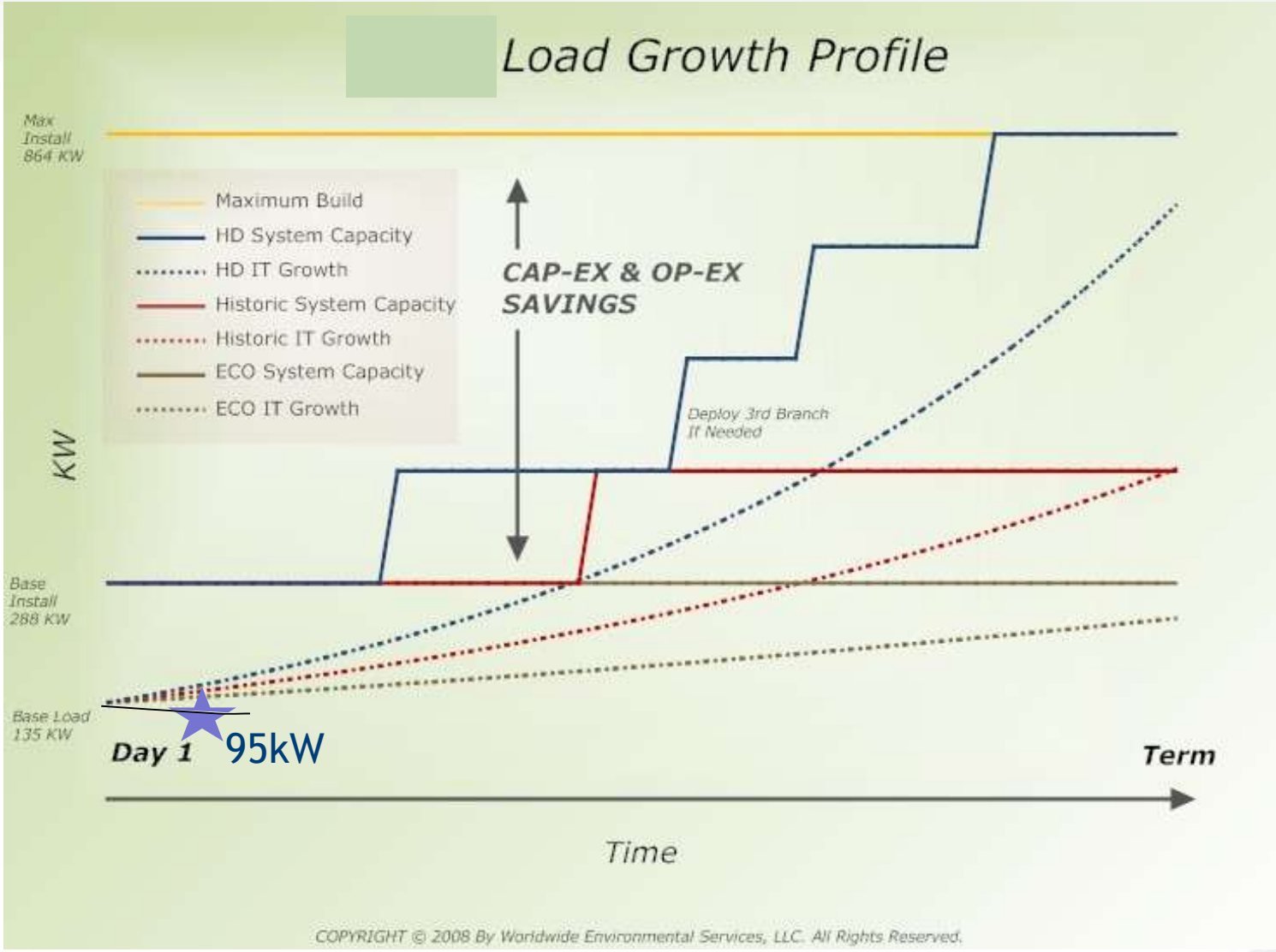
↓

Blade

↓

Software

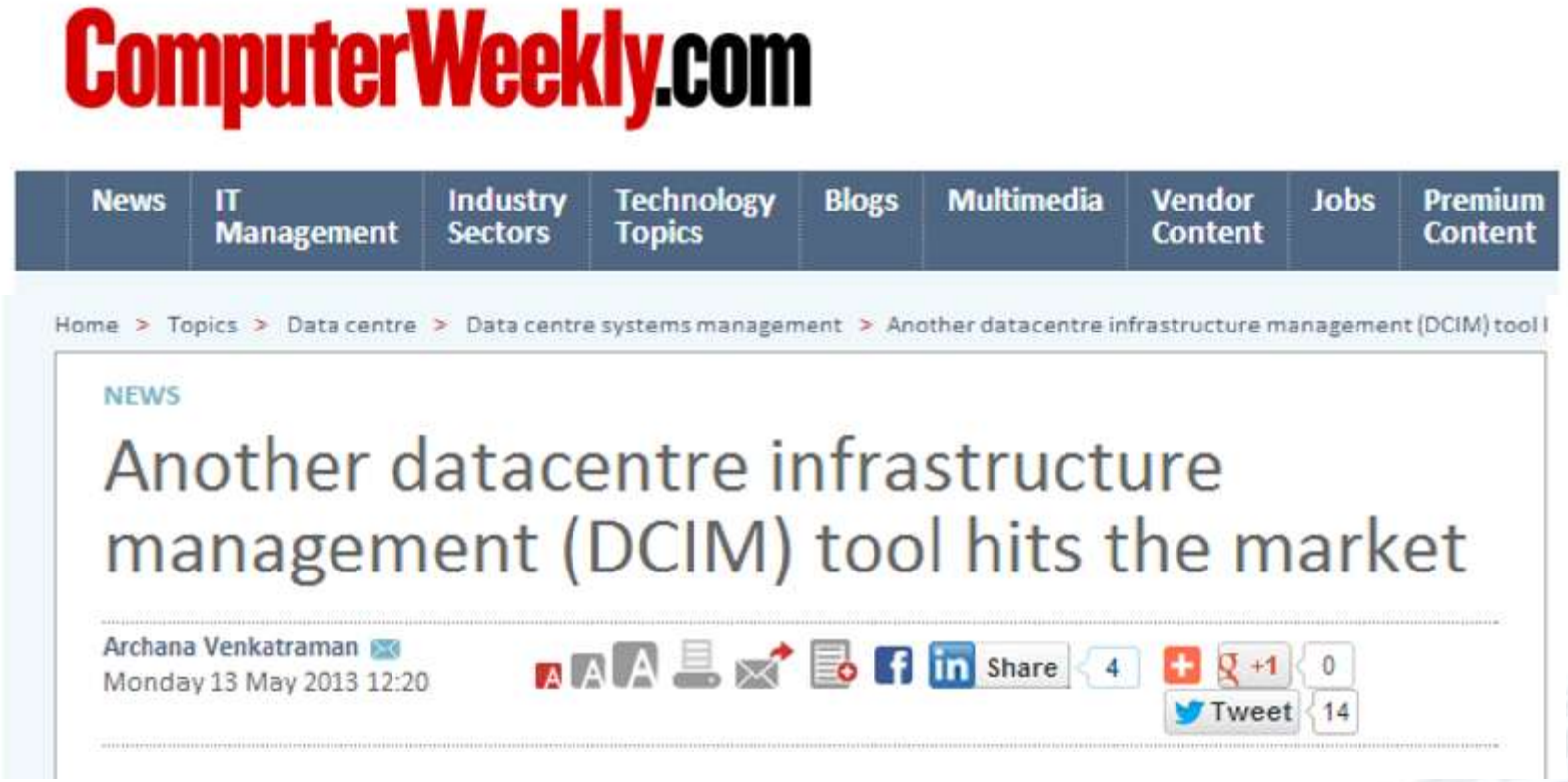
Capital Efficient



DCIM Market Place

"In 2012, the DCIM market generated around $429M in revenue and had record demand in the first quarter of 2013." Furthermore, DCIM sales are expected to grow 42% to reach $1.8B in aggregate revenue by 2013." – 451 Research

"DCIM tools and processes will become mainstream in data centers, growing from 1% penetration in 2010 to 60% in 2014." – Gartner Research

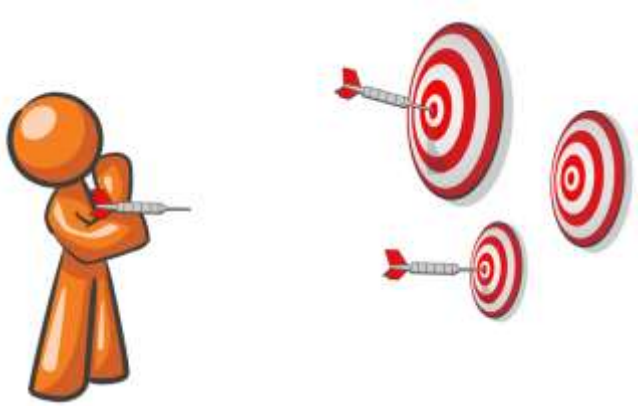


The Scramble

- Fastest Growing Section of the Data Center Market Place $ $ $ $.
- Well over 100 Vendors Claiming DCIM Solutions and/or components and growing daily.
- Hardware Vendors Offering DCIM Suits.
- Data Center Managers are demanding it.
- Information is widespread.

Confused !

Real Drivers for Improved DCIM Tools



- Data Center Manager (Bottom up)
  - Maximize Space, Power, & Cooling
  - Improve Availability
  - Improve Efficiency
  - Future Plan Projects/Deployments
- Exec's & C Levels (Top Down)
  - KPI's & Analytics
  - Strategies to Actions
  - Performance Improvements
  - Business Process Improvements

Where the DCIM Focus starts will drive the initial system definition and deployments methodologies

Full Spectrum of DCIM

- Energy & Operations
- Availability
- Risk Compliance
- Service Management
- Asset/Supply Chain
- IT Automation
- Static to Full 3D Live Modeling

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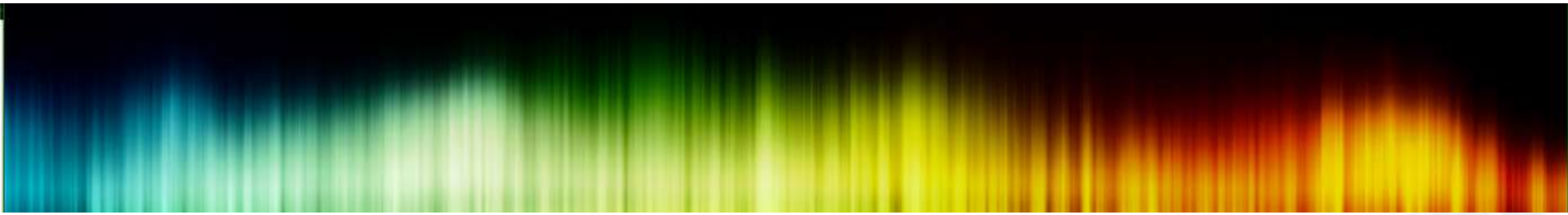
Organization Specific KPI's Records and High Level Presentations



Identify the First Order Problems

- What Perspective are you coming into the issue?
- What will be the Primary Motivator for Sponsorship in your organization?
- What immediate needs will this solve?
- How large of a initial deployment are you willing to support to understand your above assumptions?

Develop a Growth Path

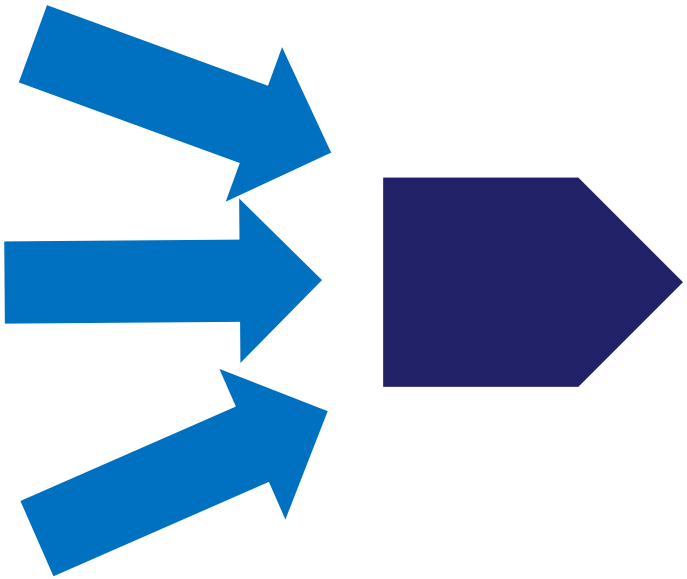
- How can this system grow from initial deployment to meet all needs?
- What components may push themselves towards second order deployment?
- How can this grow both Geographically and in Scope?
- Will the data repository allow for access via other systems and tools?

How to step in – DCIM is Very Personal

- Understand whether your organization must competitively bid a solution or work with a single vendor for a defined solution.
- Project Origination Documents must have clear definition as to intent and purpose to obtain comparable results from various vendors.
- Spend time with Solution Providers and Vendors of products to understand the strengths of each. Integrated approaches can be very successful if the needs are understood and can be deployed over time.

Approaches to Delivery

- KPI & Records Centric Approach
- Assets and Space Plan Centric Approach
- Availability and Efficiency Approach



Organizationally defined DCIM Solution

Each approach has a different start point but most of the underlying data and acquisition can be shared over time.

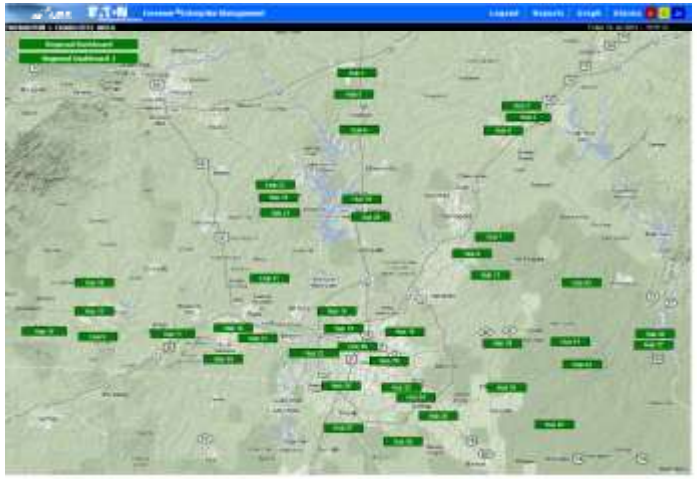
An Availability Driven Approach

Protect Customer Services from Source to Edge

- Scalable/Flexible
- Real Time Data
- Equipment Agnostic
- Uniform Interface
- Monitoring & Trending
- Alerts & Notifications
- Analysis
- Forecasting

Cable MSO Deployment

- Eaton Foreseer Platform
  - Integration of multi-vendor controllers & devices
  - WES Set-up & Integration
- Data Centers
  - 13 National & Market Centers
  - Expanding by 30% in 2013
- Headends & Hubs
  - 300 remote sites
  - Expanding by 100% in 2013

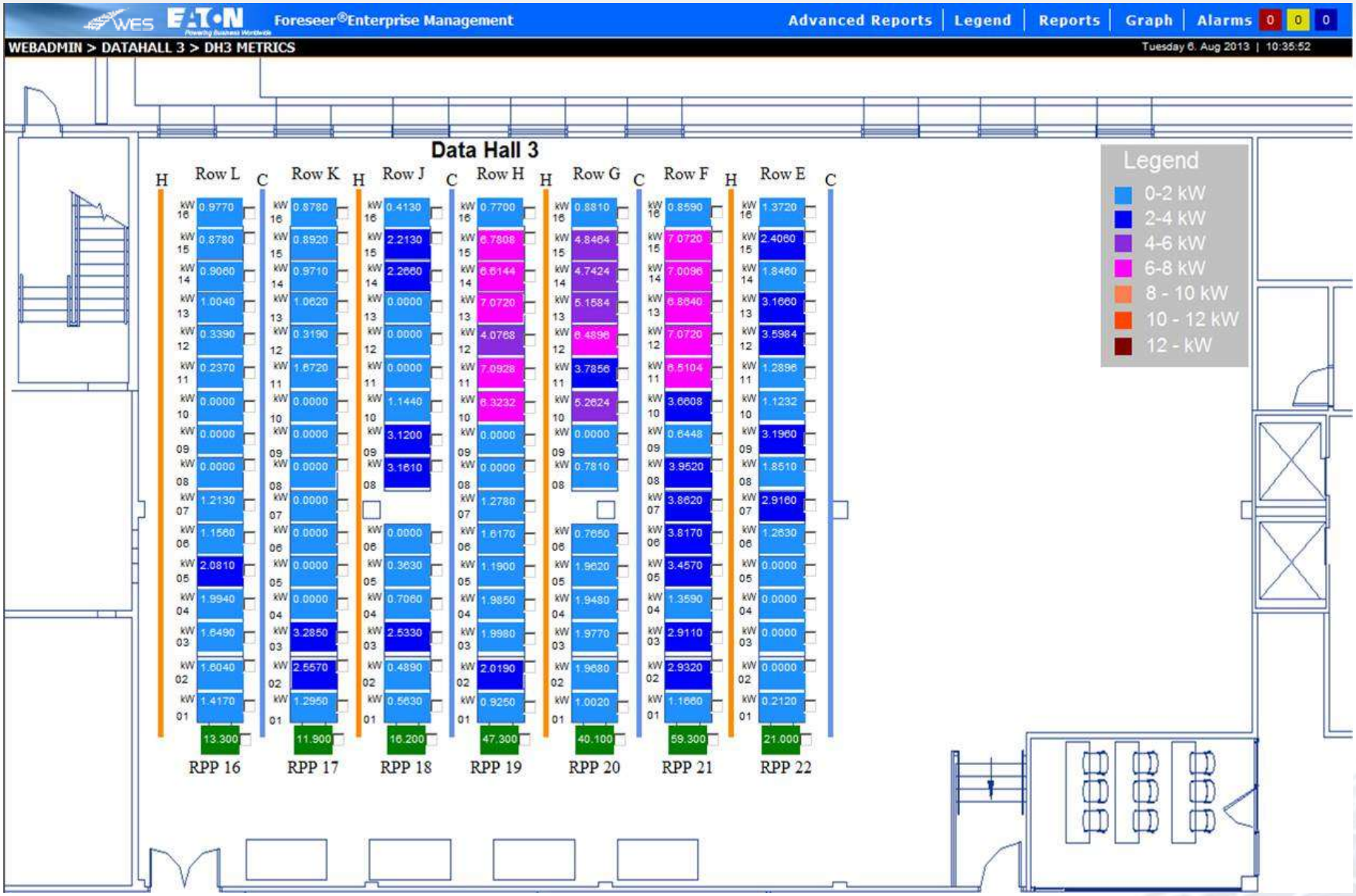


Monitoring Tools

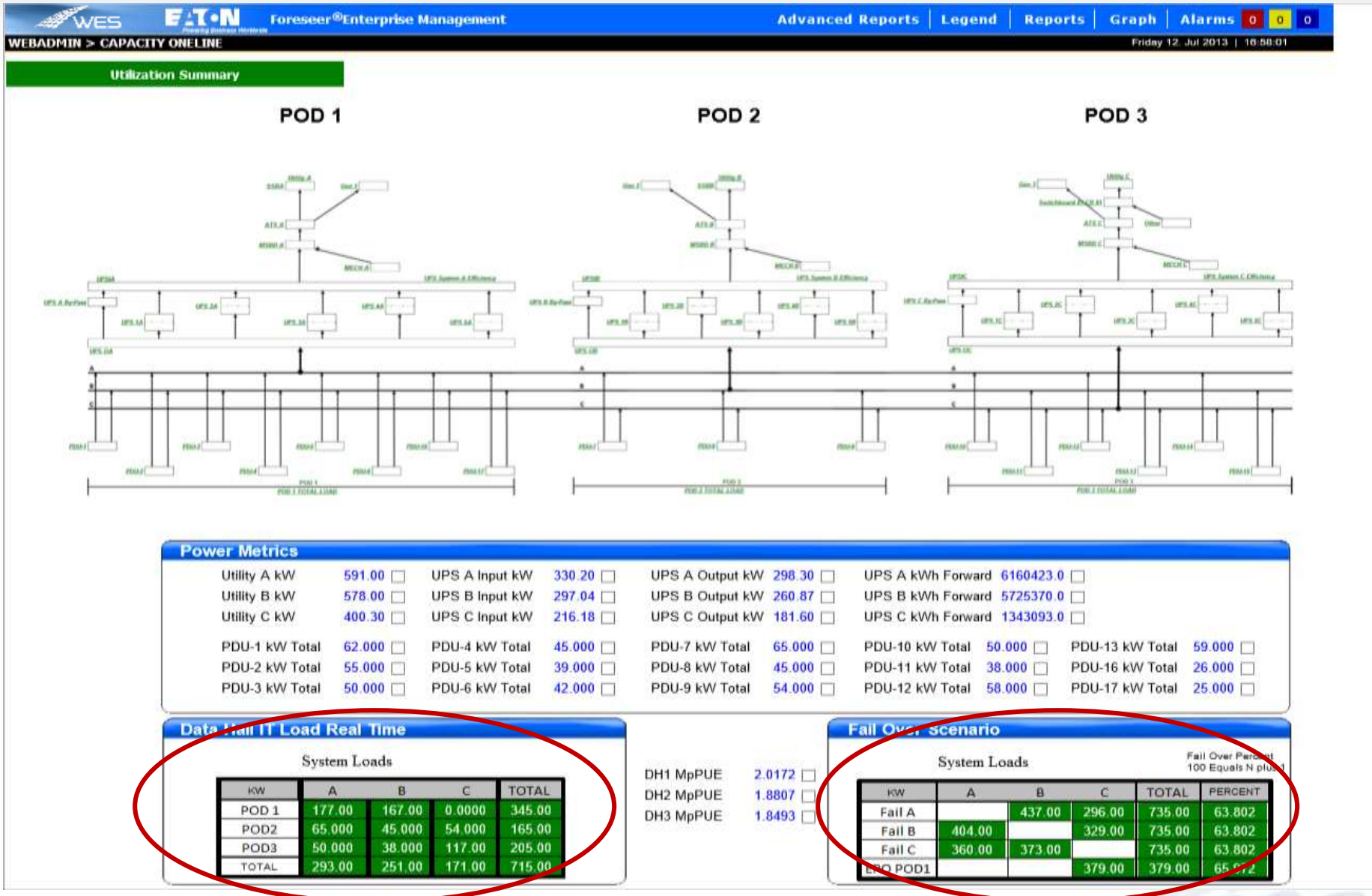
Customized Dashboards and Reporting

- Energy Load Flows
- Capacity Planning
- Utilization Monitoring
- Real-time critical metrics
- Customized notifications, views and reports
  - Technician
  - NOC
  - Management

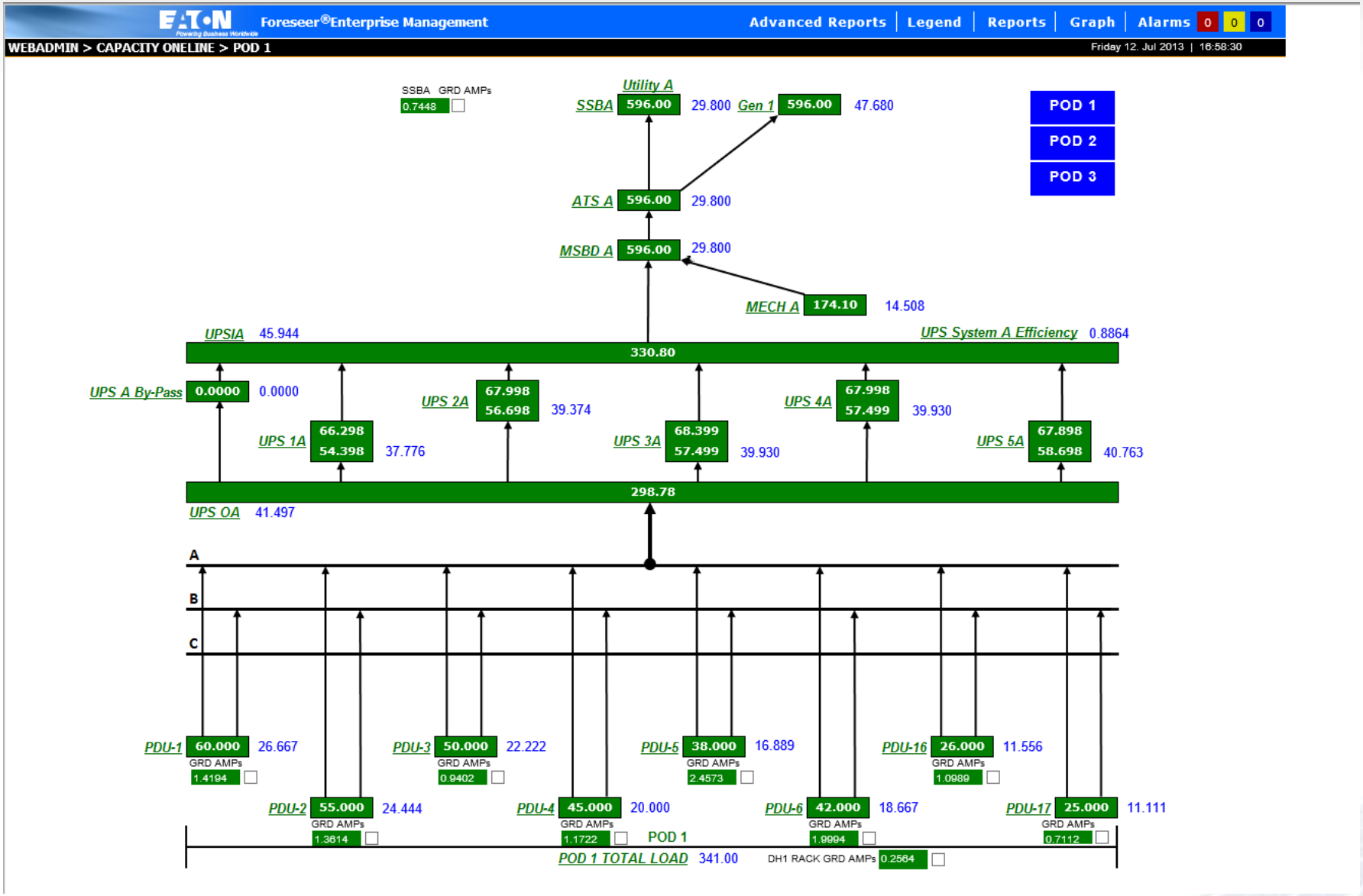
Cabinet Loading



Redundancy and Availability

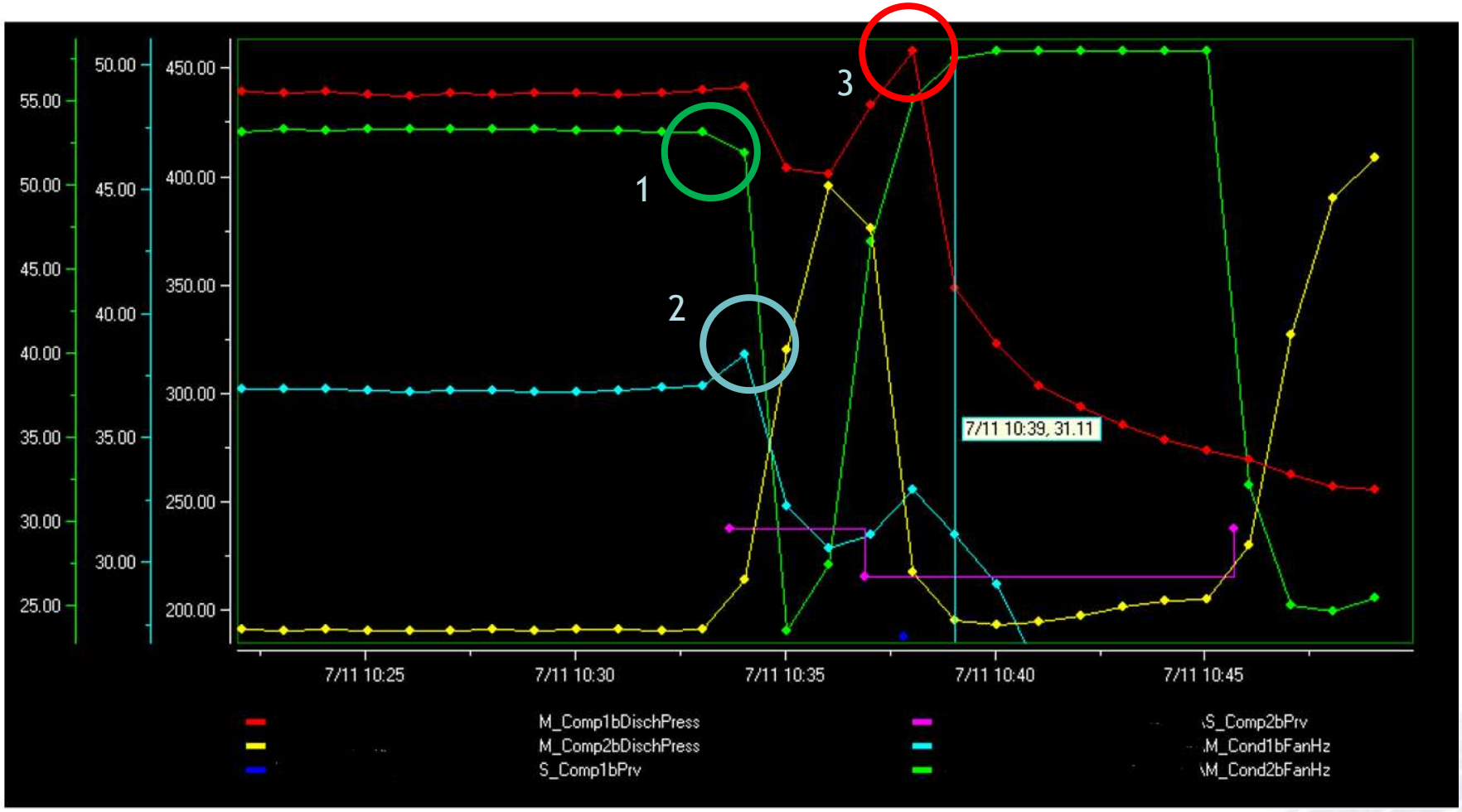


Capacity Utilization



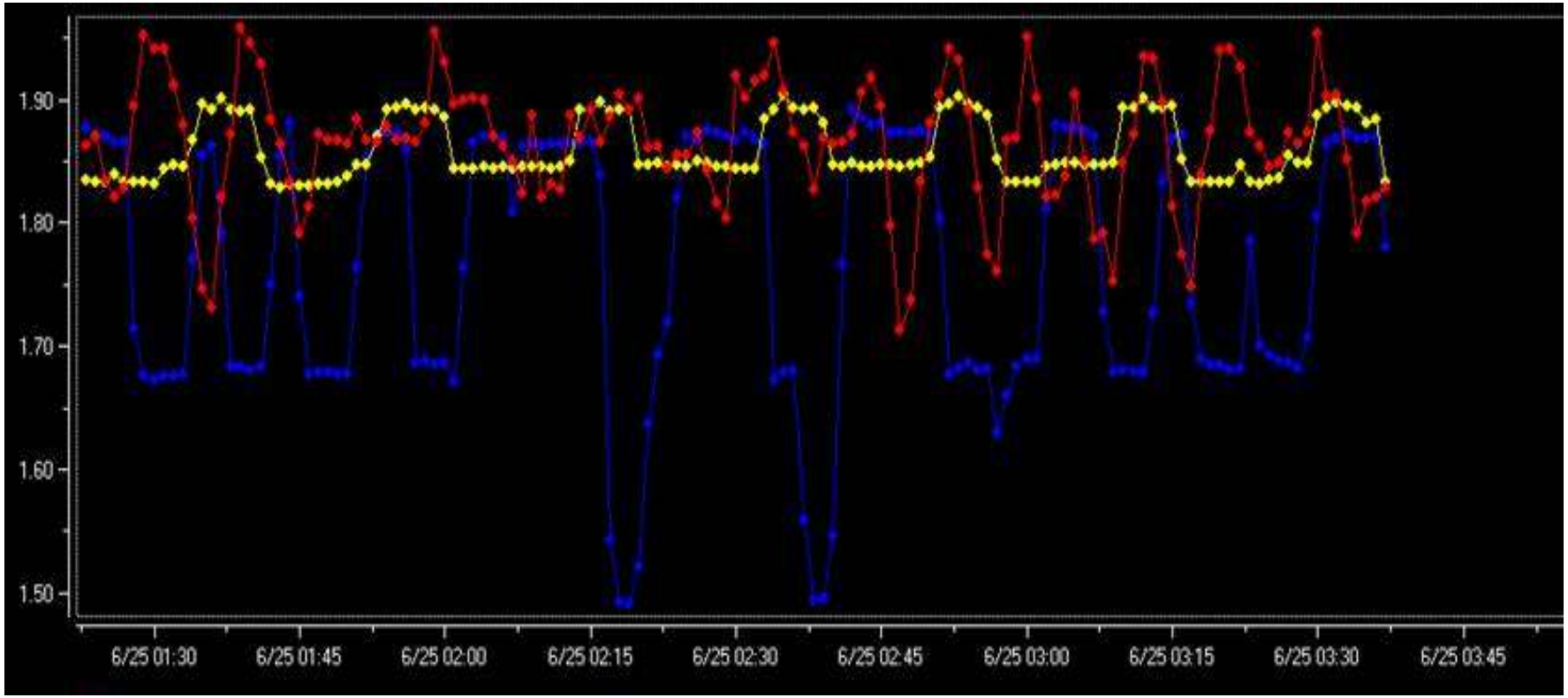
Importance of Data Archive

Proactive problem detection through data analysis



KPI's and Evaluation

Tracking Efficiency in real time.



Construction Monitoring

WES Worldwide Environmental Services

WES EATON Foreseer® Enterprise Management | Legend | Reports | Graph | Alarms 0 1 0

WEBADMIN > PARTICLE COUNTER

Wednesday 17. Jul 2013 | 08:38:05

Class	maximum particles/m³						FED STD 209E equivalent
	≥0.1 µm	≥0.2 µm	≥0.3 µm	≥0.5 µm	≥1 µm	≥5 µm	
ISO 1	10	2.37	1.02	0.35	0.083	0.0029	
ISO 2	100	23.7	10.2	3.5	0.83	0.029	
ISO 3	1,000	237	102	35	8.3	0.29	Class 1
ISO 4	10,000	2,370	1,020	352	83	2.9	Class 10
ISO 5	100,000	23,700	10,200	3,520	832	29	Class 100
ISO 6	1.0×10^6	237,000	102,000	35,200	8,320	293	Class 1,000
ISO 7	1.0×10^7	2.37×10^6	1,020,000	352,000	83,200	2,930	Class 10,000
ISO 8	1.0×10^8	2.37×10^7	1.02×10^7	3,520,000	832,000	29,300	Class 100,000
ISO 9	1.0×10^9	2.37×10^8	1.02×10^8	35,200,000	8,320,000	293,000	Room air

Conditions

Sample Temperature	81.543
Sample Humidity	37.324

Communications

Device Communications	Online

Raw 10 Second Particle Data

03 Micron particle	14675.0
05 Micron particle	405.00
1 Micron Particle	37.000
3 Micron particle	1.0000
5 Micron particle	1.0000
10 Micron particle	1.0000

ISO 14644-1 Class 8 Equivalent

ISO 03 Micron particle per M³	30484866.0
ISO 03 Micron percent	298.87
ISO 05 Micron particle per M³	841320.0
ISO 05 Micron percent	23.901
ISO 1 Micron particle per M³	76861.3
ISO 1 Micron percent	9.2381
ISO 5 Micron particle per M³	2077.33
ISO 5 Micron percent	7.0899

Harnessing the Power of Data

Questions?