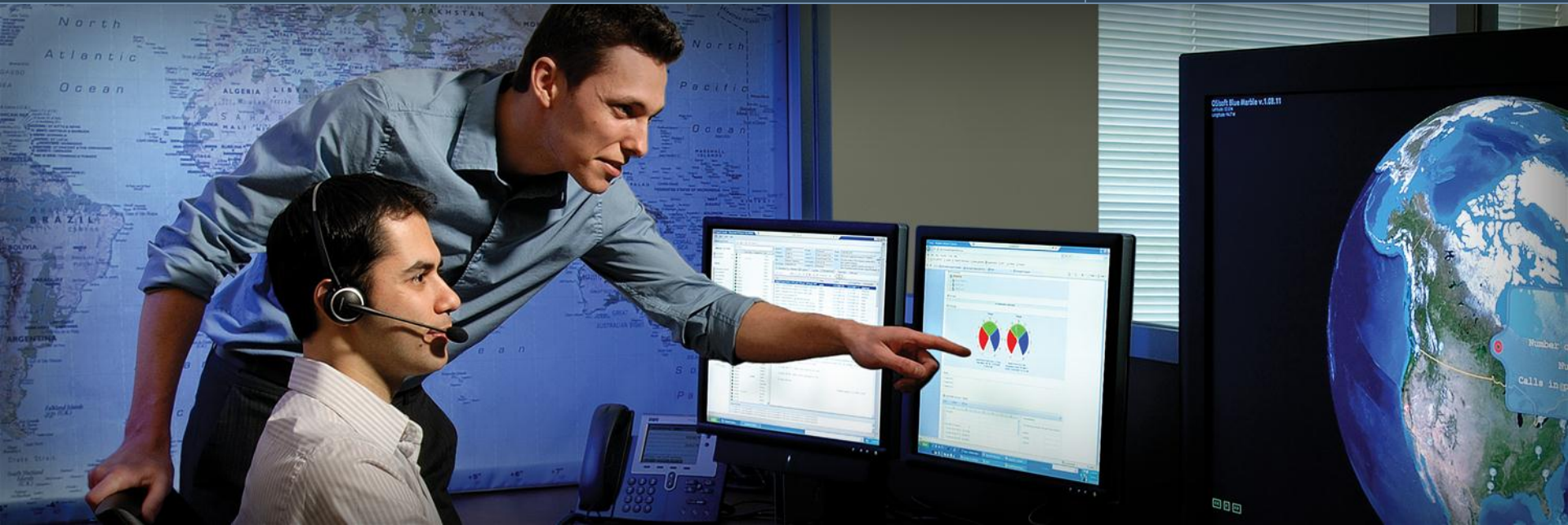# Regional Seminar Series
New York, NY

OSIsoft®

eBay's Data Center:
The PI System Makes Data Centers Green

Greg Dumas
DST Controls

November 5th 2010

Empowering Business in Real-time

Introduction

On an average day, someone on eBay
- sells a vehicle every minute
- sells auto parts every second
- sells diamond jewelry every
     2 minutes.

"The foundation of our revenue is our data centers…"

Dean Nelson, eBay
Dir, Global DC Strategy

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Motivation: Improve operations

- Treat Facilities and IT as a holistic system
- Integrate real time data into corporate decision making
- Present real time data collection as a single system with an enterprise-wide interface
- Compare real time result to original building design requirements of capacity, availability and scalability

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eBay Selects South Jordan For Data Center

...and seeks the U.S. Green Building Council's
        Leader in Energy and Environmental Design (LEED) certification,
            ..Dean Nelson, the senior director of global data center strategy
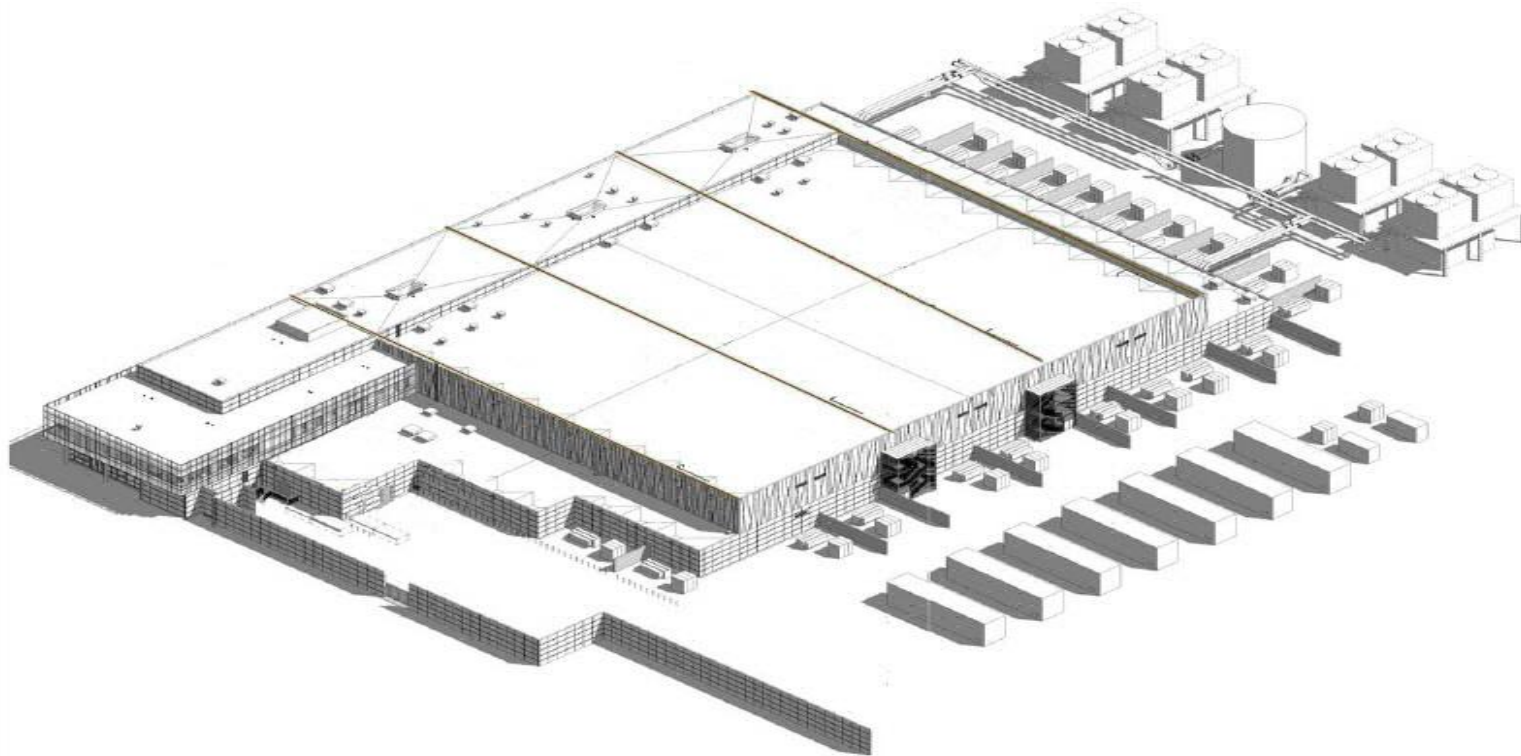
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Agenda

➢ *eBay requirements*

Monitoring system Architecture

Building the Monitoring system
- Screens and Points

How do people use it?

What did we gain?

Where to from here?

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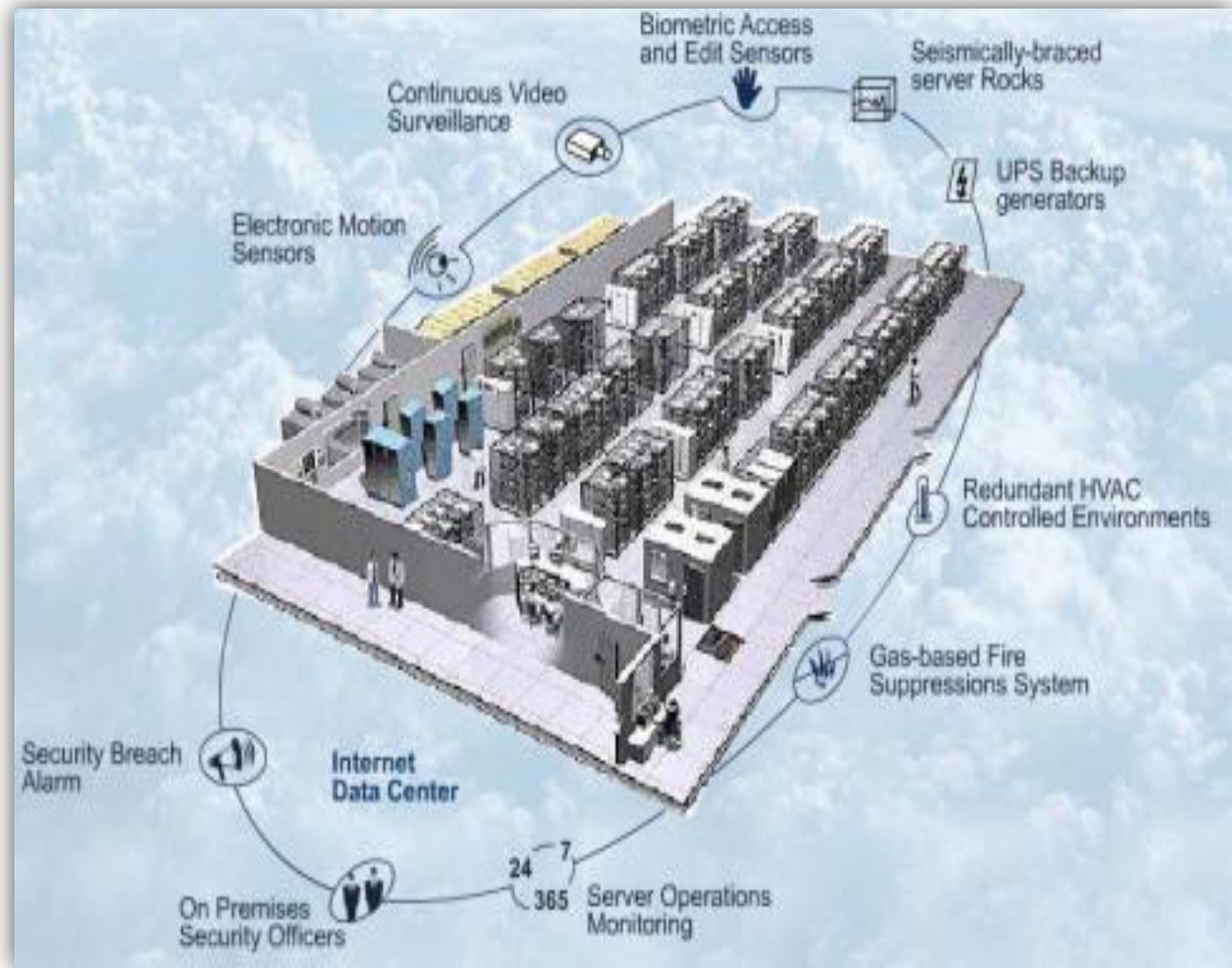# Customer Requirements & Project Size

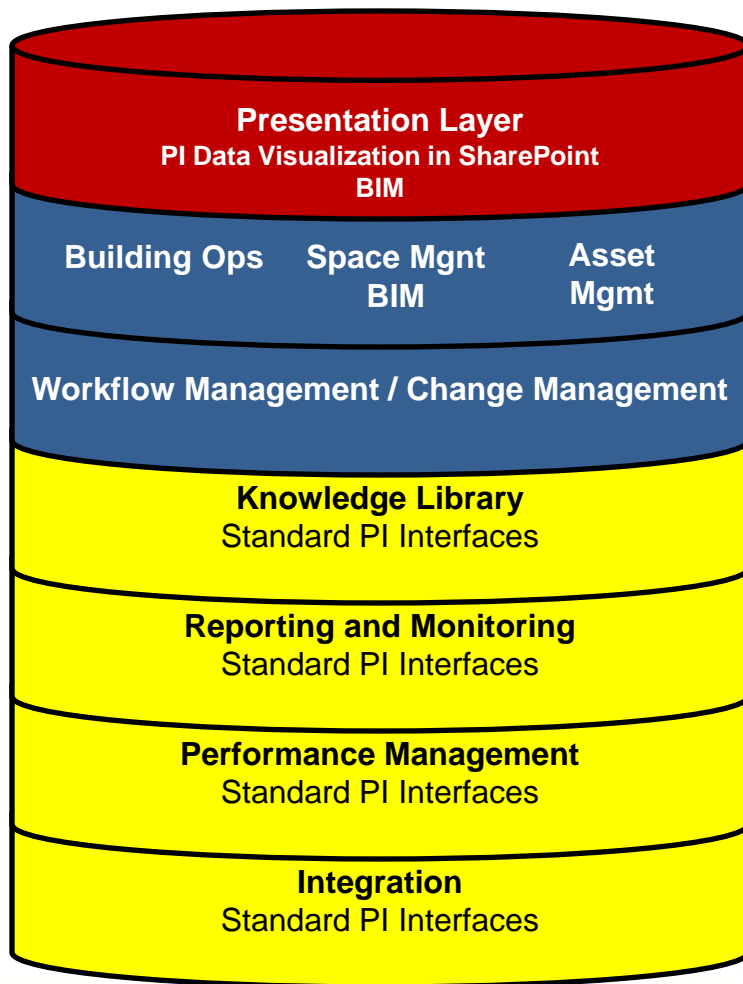60,000 sq ft of raised floor - 7.2 Mw of N+2 IT load - 4X expandable

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Monitoring Requirement

Treat Mechanical, Power, IT and Security as one complete system

- *Nearly 1000 devices*

- *Over 110,000 points*

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Enterprise Integration Requirement

Presentation Layer
PI Data Visualization in SharePoint
BIM

Building Ops   **Space Mgnt**   **Asset Mgmt**
BIM

Workflow Management / Change Management

Knowledge Library
Standard PI Interfaces

Reporting and Monitoring
Standard PI Interfaces

Performance Management
Standard PI Interfaces

Integration
Standard PI Interfaces

Capacity & Load Planning Systems

Data Center Simulation Toolkits
Power, Cooling, Space, Network

Nationwide alarming & trouble ticket systems

- 1000 points per 10 minutes
- remote from Salt Lake City by 1000 miles

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Agenda

eBay requirements

➢ *Monitoring Architecture*

Building the Monitoring system

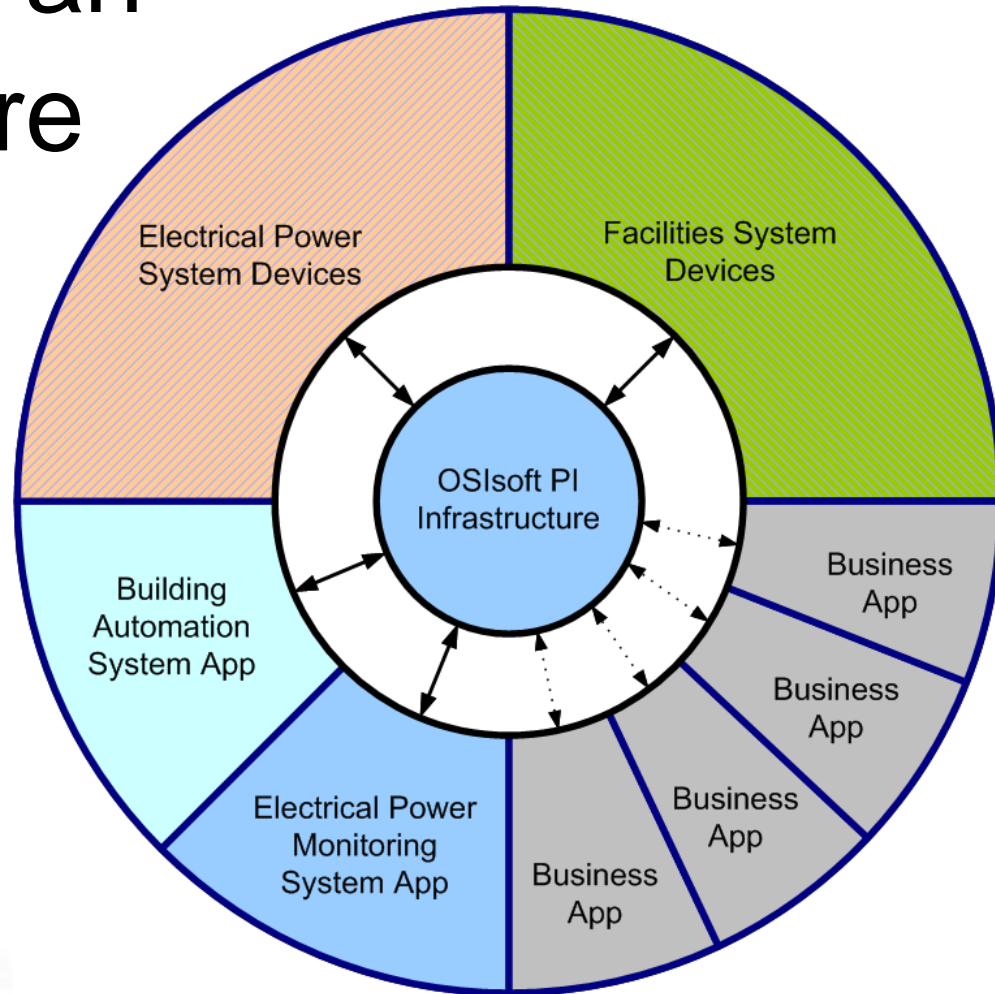The result:

How do people use it?

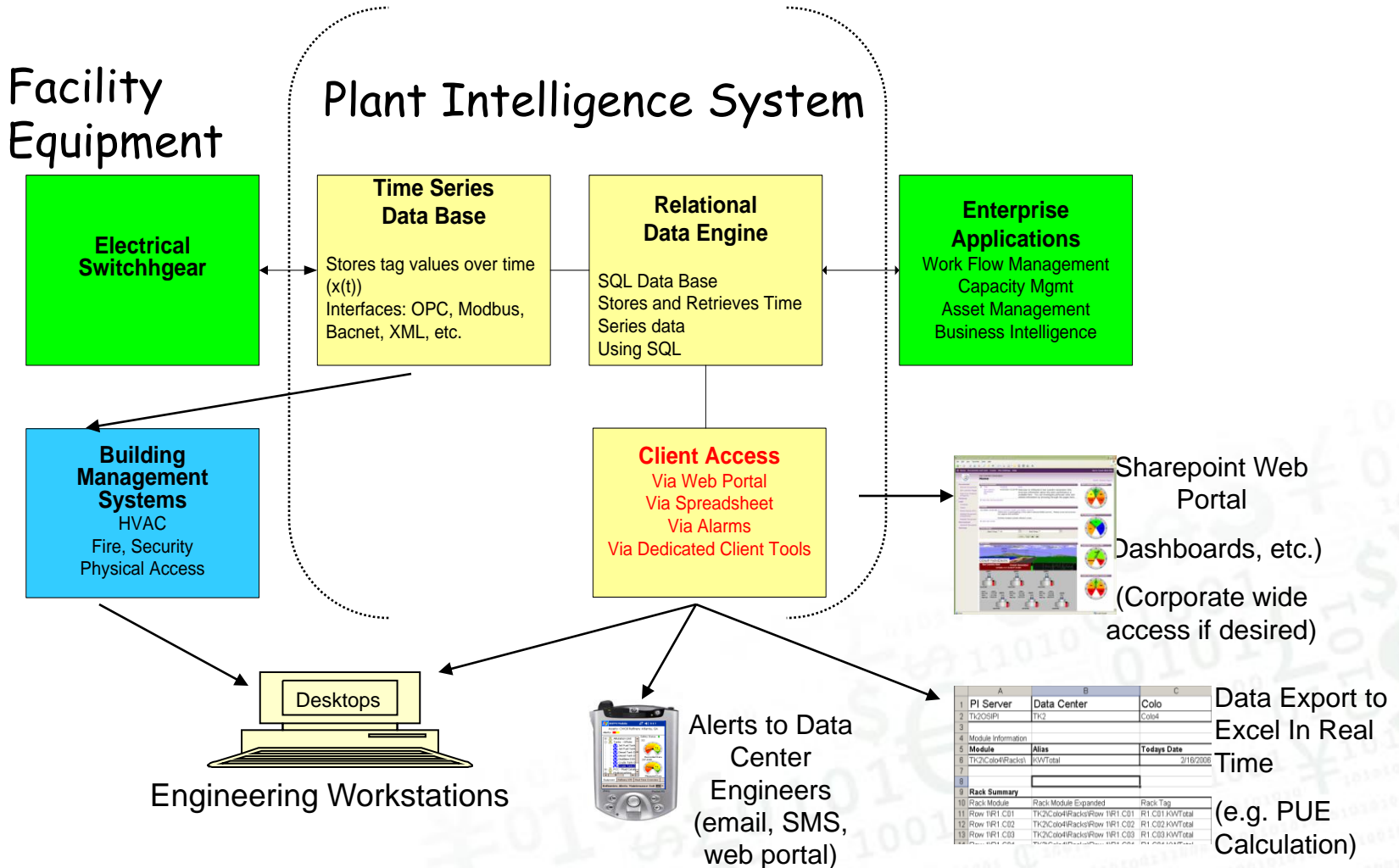Where to from here?

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Why the PI System?

- Leader in Asset and facility management software integration into BIM

- Only Infrastructure chosen by IT providers Microsoft, IBM, HP, Cisco

- Only infrastructure capable of handling real-time data over 1M points on single server

- Only open architecture platform from Data Connectors through applications – with development platform .net

- Fastest Infrastructure available 250,000 events per second

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PI System is an infrastructure

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PI System in relation to Enterprise

Facility Equipment

Plant Intelligence System

Electrical Switchhgear	

Time Series Data Base

Stores tag values over time (x(t))
Interfaces: OPC, Modbus, Bacnet, XML, etc.

Relational Data Engine

SQL Data Base
Stores and Retrieves Time Series data
Using SQL

Enterprise Applications
Work Flow Management
Capacity Mgmt
Asset Management
Business Intelligence

Building Management Systems
HVAC
Fire, Security
Physical Access

Client Access
Via Web Portal
Via Spreadsheet
Via Alarms
Via Dedicated Client Tools

Sharepoint Web Portal

Dashboards, etc.)

(Corporate wide access if desired)

Desktops

Engineering Workstations

Alerts to Data Center Engineers (email, SMS, web portal)

Data Export to Excel In Real Time

(e.g. PUE Calculation)

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Agenda

eBay requirements

Monitoring Architecture

➢ *Building the Monitoring system*

The result:

How do people use it?

Where to from here?

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Building the Monitoring System- Electrical Network - 138KV to 110V

Primary distribution from the Utility

House systems distribution

Automatic transfer switch

Backup generator

Critical power bus

UPS

Mechanical distribution

PDU

Cooling tower

CRAC

Chiller

Rack

IT equipment
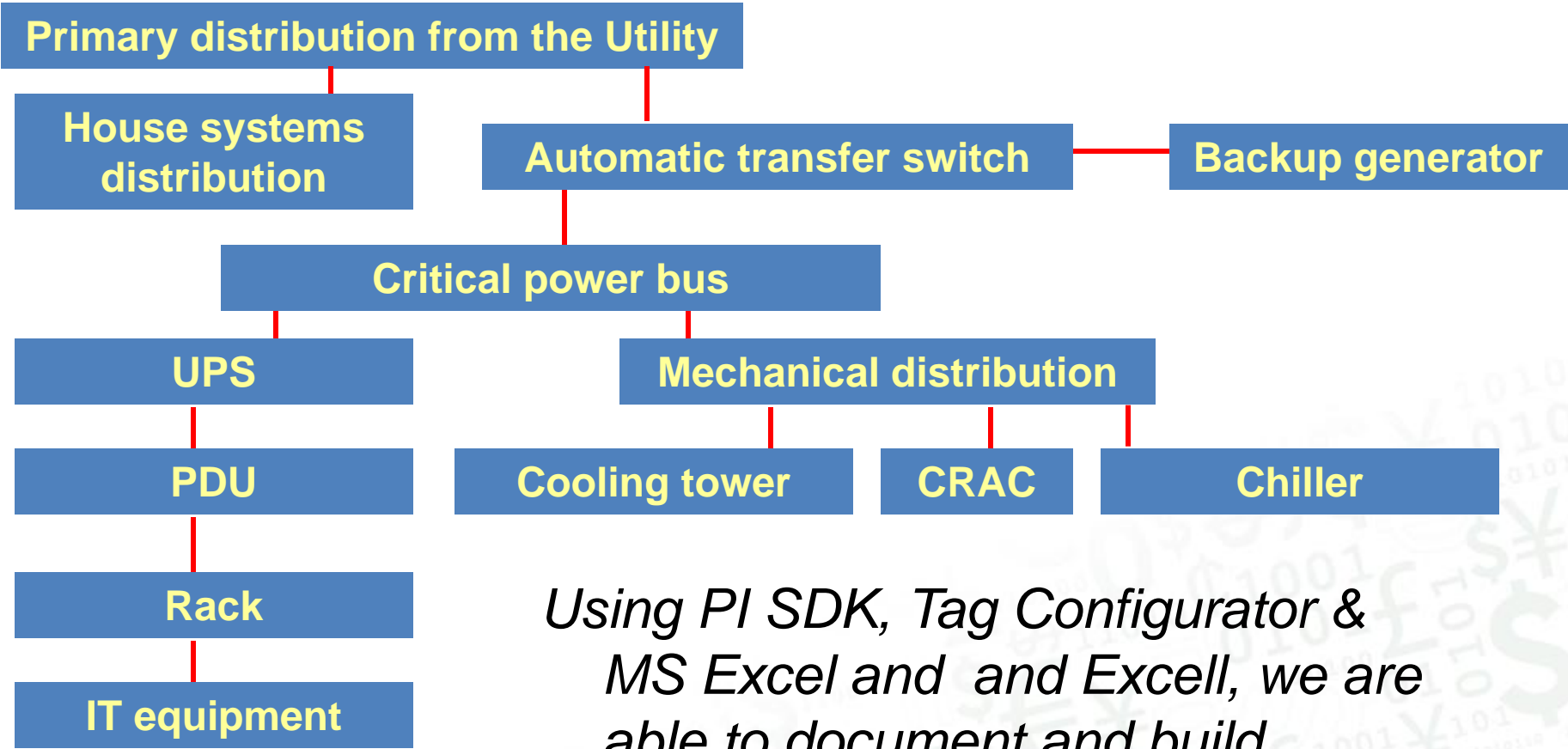
Using PI SDK, Tag Configurator & MS Excel and and Excell, we are able to document and build 60,000 tags in 20 minutes.

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Building the screens

Using PI WebParts, PI ProcessBook and 3rd party tools such as AutoCad,
we built a 200 page web site

We focused on Sharepoint and Silverlight architecture and tools.

We converted CAD files directly into screens

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Building the Notifications

Silverlight

Sharepoint

Web Service

PI, AF/AN SDKs

Templates

PI Notifications

Microsoft®
Silverlight™

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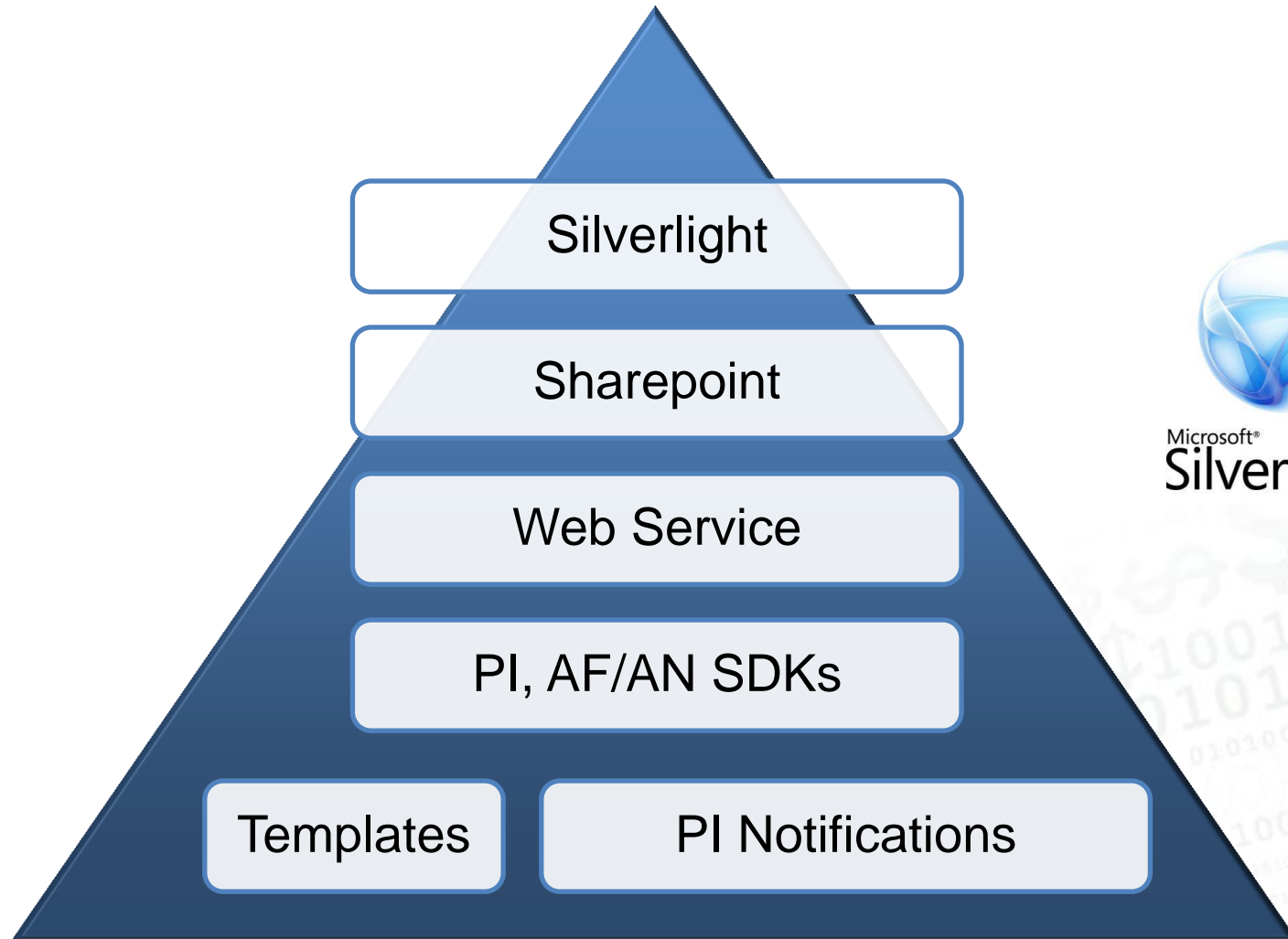
Special Situation:
Monitoring the Primary Utility Feeds

138kv utility feed

eBay and Utility
   wanted to exchange
   power levels

Solution:
   bi-directional info
   transfer with Utility

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Agenda

eBay requirements

Monitoring Architecture

Building the Monitoring system

➢ *The result:*

How do people use it?

Where to from here?

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Network Ops Center Main Screen
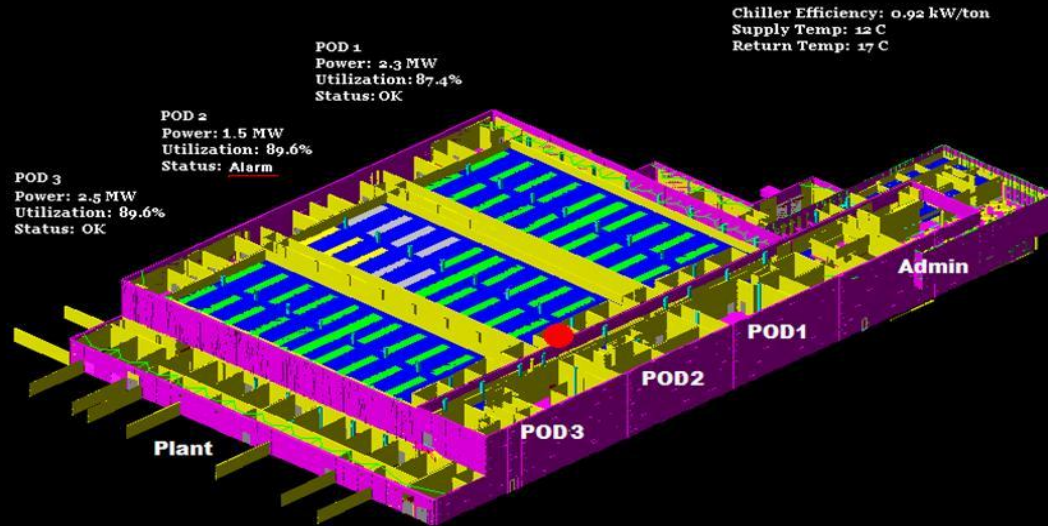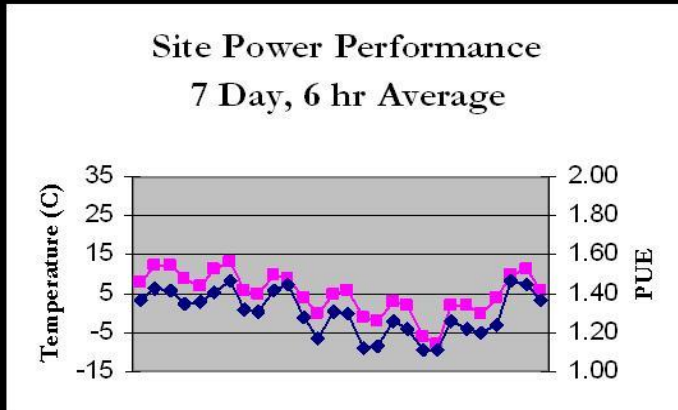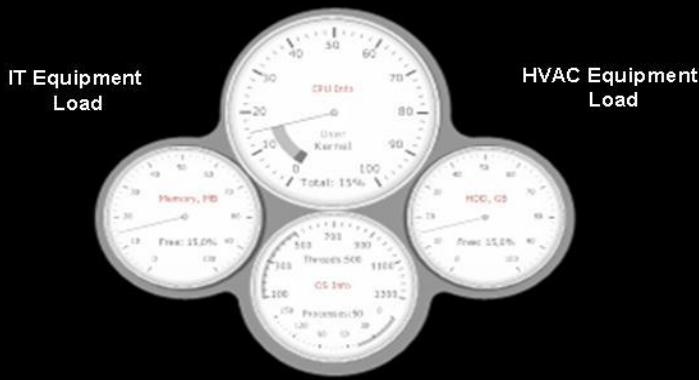
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Adding a Rack: Data Flow

Integrated Asset Information
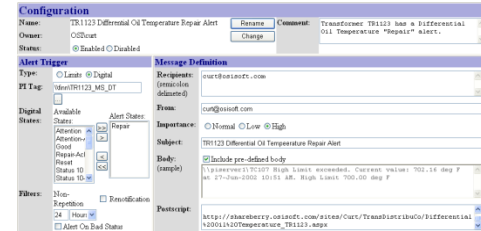
Alert Notification Work Order Generation

Asset Information Structure (PI and RDB)
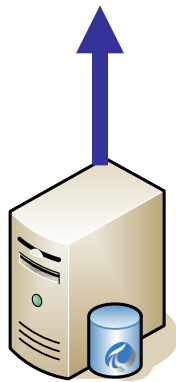
Real-time Rule Assessment

Asset Reliability

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ebaY

Site Actions ▾

- Plant View
- Power Detail
- First Floor
- Second Floor
- Oneline Map
- BMS Map
- Webcontrol
- Power Analytics
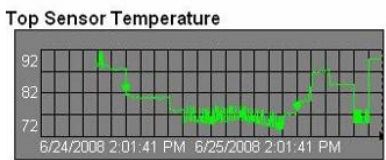- SER Event Data
- Server Status
- NOC Overview

Total Rack Power 3,530 W 17 A

Top Sensor
Temperature 90.00° F
Rel. Humidity 30.00 %

Strip 2
Over all Power 883 W
Over all Current 4 A
Outlet 08 0 W
Outlet 07 147 W
Outlet 06 147 W
Outlet 05 148 W
Outlet 04 147 W
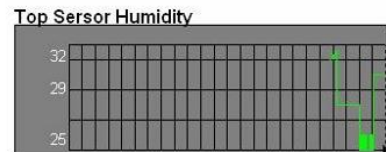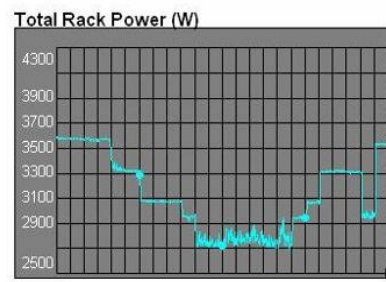Outlet 03 147 W
Outlet 02 147 W
Outlet 01 147 W

Strip 1
Over all Power 884 W
Over all Current 4 A
Outlet 08 0 W
Outlet 07 147 W
Outlet 06 147 W
Outlet 05 146 W
Outlet 04 148 W
Outlet 03 147 W
Outlet 02 146 W
Outlet 01 148 W

Strip 4
Over all Power 883 W
Over all Current 4 A
W 0 Outlet 08
W 148 Outlet 07
W 148 Outlet 06
W 148 Outlet 05
W 148 Outlet 04
W 148 Outlet 03
W 148 Outlet 02
W 148 Outlet 01

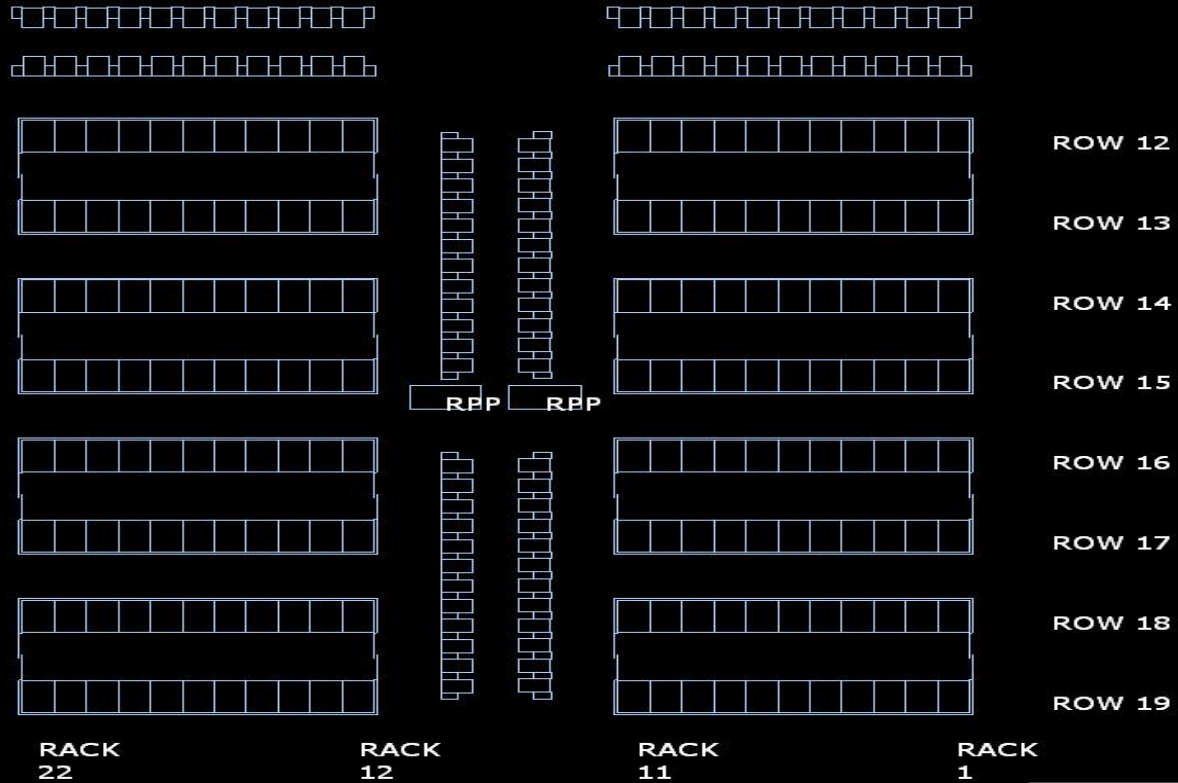**Strip 3**
Over all Power 884 W
Over all Current 4 A
W 0 Outlet 08
W 148 Outlet 07
W 148 Outlet 06
W 148 Outlet 05
W 148 Outlet 04
W 148 Outlet 03
W 148 Outlet 02
W 148 Outlet 01

Server 14
Server 13
Server 12
Server 11
Server 10
Server 09
Server 08
Server 07
Server 06
Server 05
Server 04
Server 03
Server 02
Server 01

Base Sensor
Temperature 75.00° F
Rel. Humidity 20.00 %

Legend
Circuit Load Status
- OK
- Warning
- Critical

Top Sensor Temperature
92
82
72
6/24/2008 2:01:41 PM 6/25/2008 2:01:41 PM

Top Sersor Humidity
32
29
25

Total Rack Power (W)
4300
3900
3700
3500
3300
3100
2900
2500

Base Sensor Temperature
76
73
69

Base Sensor Humidity
22
19
15

Alarm History

DST CONTROLS

Real Time Information — Currency of the New Decade

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Rack Installed !

Agenda

eBay requirements

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The result:

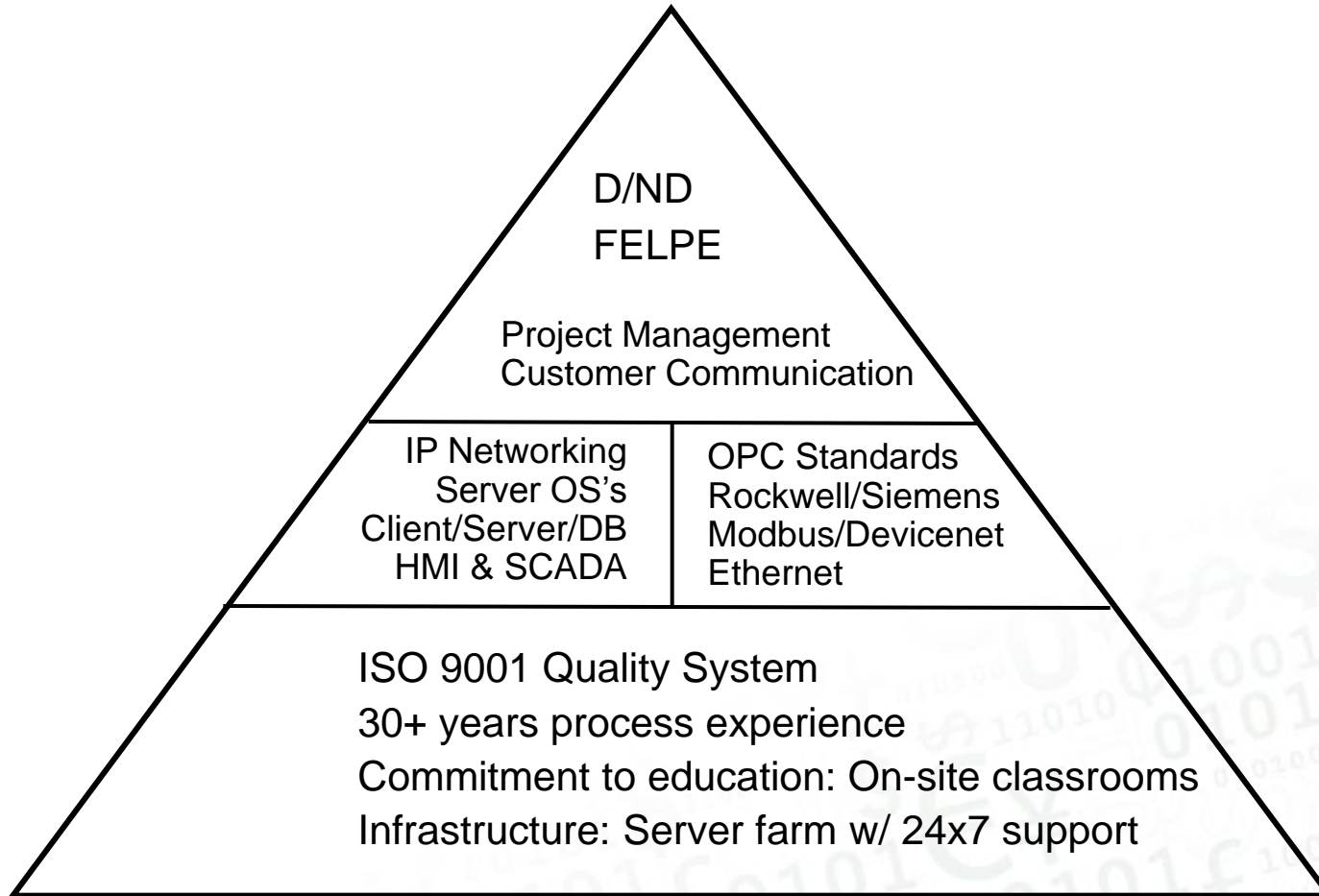How do people use it?

➢ *Where to from here?*

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Future: Trend CPU Load with

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Who is DST Controls?

D/ND
FELPE

Project Management
Customer Communication

| IP Networking Server OS's Client/Server/DB HMI & SCADA | OPC Standards Rockwell/Siemens Modbus/Devicenet Ethernet |

ISO 9001 Quality System

30+ years process experience

Commitment to education: On-site classrooms

Infrastructure: Server farm w/ 24x7 support

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Questions ?

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