



Demystifying the Data Center



Presented by **Brandon Lake (Casne Engineering) & Stephanie Gupana (Digital Realty)**



Conference Theme and Keywords



Digital Realty

<p>ONE OF THE LARGEST GLOBAL DATA CENTER PORTFOLIOS IN THE INDUSTRY</p> <p>150+ PROPERTIES ⁽¹⁾</p> <p>33+ METROPOLITAN AREAS ⁽¹⁾</p> <p>26 MILLION RENTABLE SQUARE FEET ⁽²⁾</p>	 <p>DIGITAL REALTY</p> <p>\$14 Bn EQUITY MARKET CAPITALIZATION ⁽³⁾</p> <p>\$22 Bn ENTERPRISE VALUE ⁽³⁾</p> <p>15th LARGEST PUBLICLY TRADED U.S. REIT ⁽⁴⁾</p> <p>2016 MAY ADDED TO THE S&P 500 INDEX</p>	<p>SERVING COMPANIES AROUND THE WORLD.</p>  <p>2,500+ CUSTOMERS</p> <hr/> <p>FINANCIALLY STABLE FOR THE LONG TERM ⁽⁵⁾</p> <p>FitchRatings <i>BBB</i></p> <p>MOODY'S <i>Baa2</i></p> <p>S&P Global Ratings <i>BBB</i></p>
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- As of March 31, 2016. Includes investments in fourteen properties held in unconsolidated joint ventures.
- As of March 31, 2016. Includes 1.8 million square feet of active development and 1.2 million square feet held for future development.
- Balance sheet figures reflective of quarter end March 31, 2016, adjusted for the €600 million Euro bond offering on April 15, 2016. Closing stock price was \$94.40 as of May 13, 2016.
- U.S. REITs within the RMZ. Source: companies' financials based on latest public filings. Based on equity market capitalization as of March 31, 2016.
- These credit ratings may not reflect the potential impact of risks relating to the structure or trading of the Company's securities and are provided solely for informational purposes. Credit ratings are not recommendations to buy, sell or hold any security, and may be revised or withdrawn at any time by the issuing organization in its sole discretion. The Company does not undertake any obligation to maintain the ratings or to advise of any change in ratings. Each agency's rating should be evaluated independently of any other agency's rating. An explanation of the significance of the ratings may be obtained from each of the rating agencies.

Digital Realty (DLR) & Telx

DLR



Telx

With the acquisition of Telx in October 2015, Digital Realty was able to expand footprint their colocation and connectivity line of business.

History



- Founded in 1979
- Employee-Owned
- Comprised of Engineers, Integrators, Technologists
- Trusted Advisors

Active Partners



- OSISOFT Partner Since 2001
- Technology Partner with: ESRI, Schneider, Rockwell, Siemens
- Over 500 clients
- 200 OSISOFT PI System projects

Key Industries



- Data Centers / Facilities
- Power and Utilities
- Process Industries

What is a colocation data center?

- Type of data center where space (facility/floor/suite), power, cooling, security and network equipment are available to rent for retail customers.
- Colocation data centers are able to connect retail customers to a variety of telecommunications and network service providers.

DLR operates 20+ colocation data centers across the US (some of which are landlord owned), 79 floors, 90+ suites.

What is a Colocation Product & its Requirements?

Colocation

Enabling small (1 Cabinet) to medium (300kW Cage) deployments

Ability to quickly deploy computing infrastructure in days, contract for 2-3 years

Consistent designs, operational environment and power expenses

SPACE

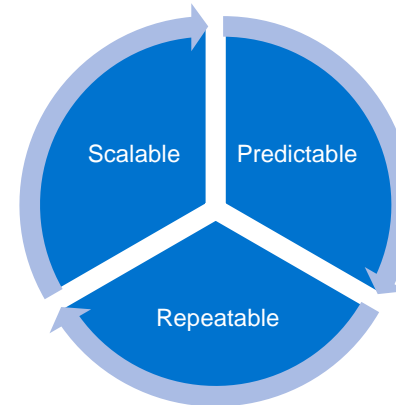
- Cabinets & Cages

POWER

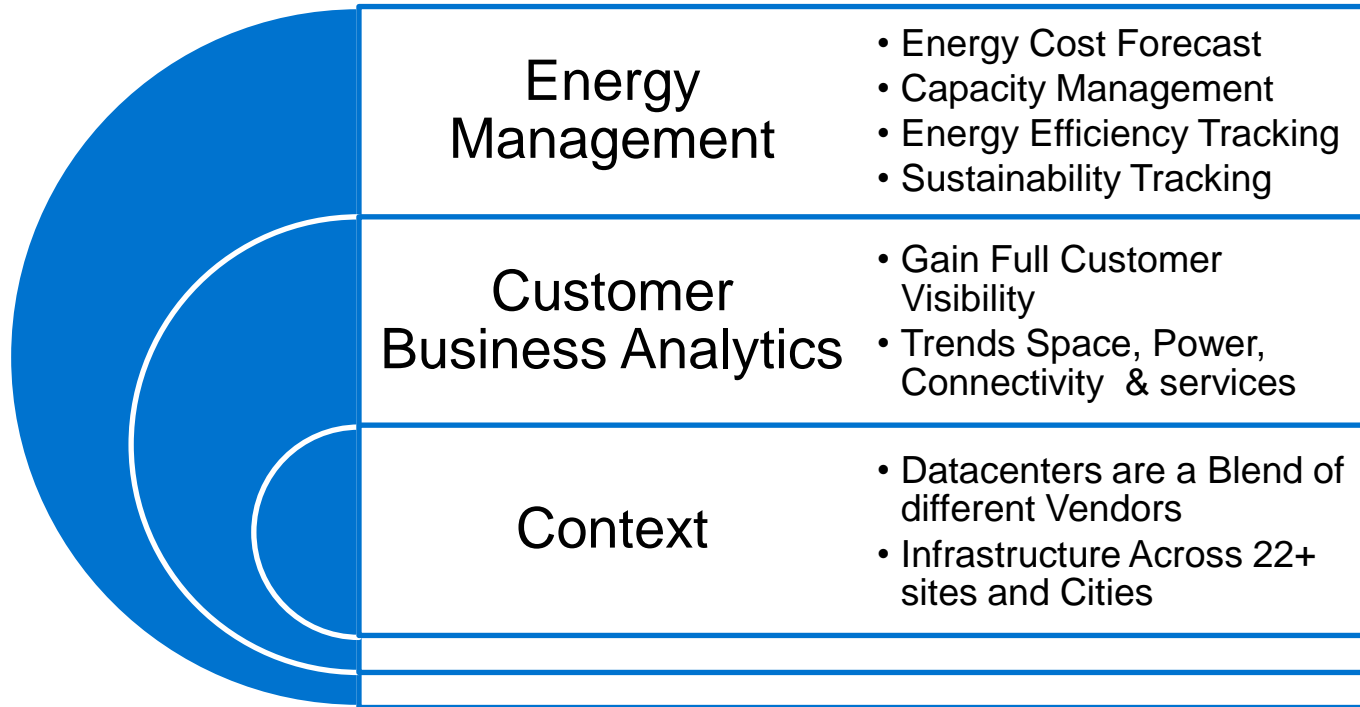
- kW model and Breaker

Requirements to be Successful?

- A Fast, Predictable & Repeatable Quote to Cash Process.
- Technical Tools that can be an Integral Part of the Colocation Process.



Colocation: Energy & Capacity Management



Challenge

The ability to collect, aggregate, normalize, analyze, and present data center operations and asset performance information across portfolio.

Real – Time
Performance
Metrics

Automated
Reports

Integrate with
upstream and
downstream
systems

Use Case Focus Areas

Power Usage Effectiveness (PUE)

Customer Usage

Circuit Allocation & Capacity Planning

PUE you say....?

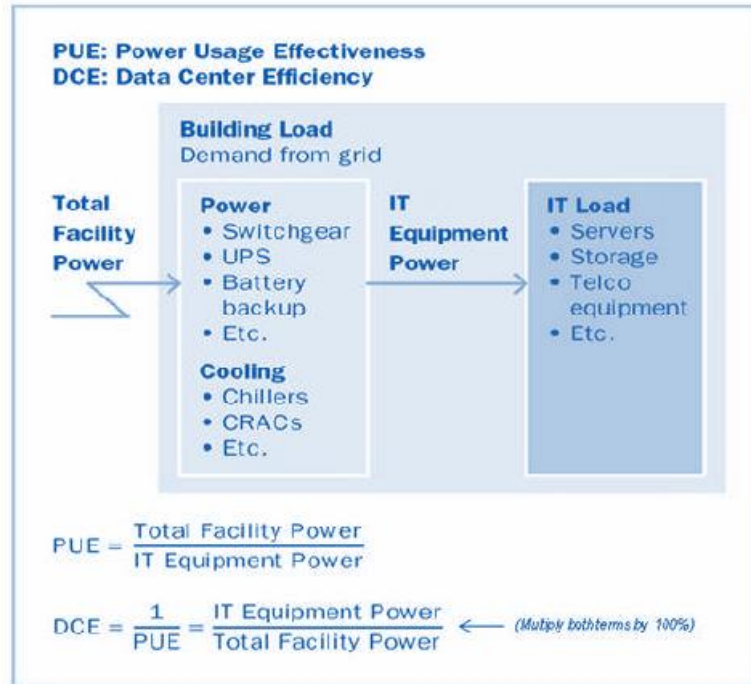
- PUE (Power Usage Effectiveness) is the metric to base efficiency or how well a data center uses energy.

$$PUE = \frac{\textit{Total Facility Load}}{\textit{IT Load}}$$

- Also used as a baseline to ensure that operational changes are showing measurable changes in efficiencies.

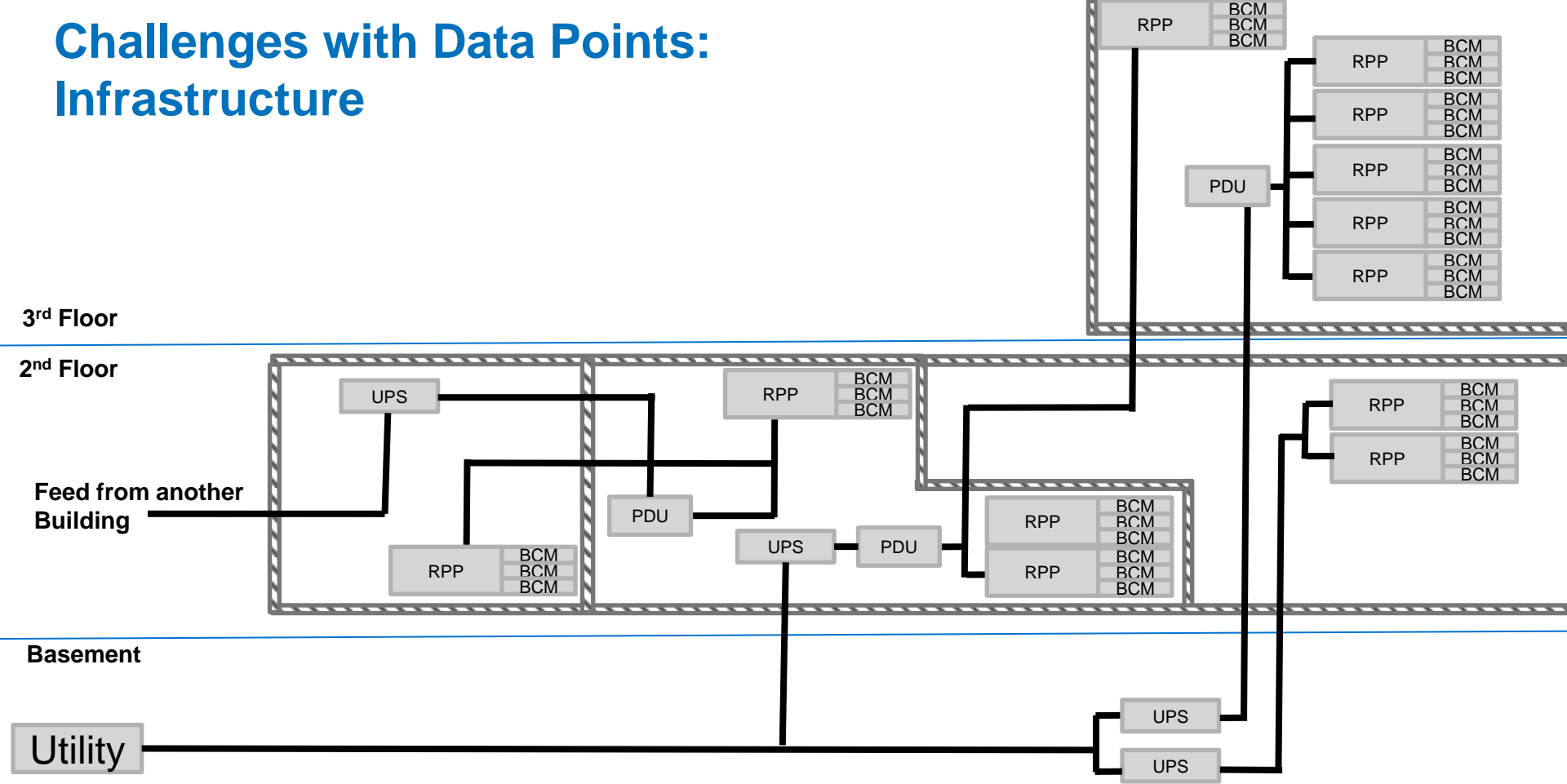
All federal agencies are mandated to report <1.4 PUE on their Data Centers by 2018 (<1.2 is encouraged)

PUE Data Points



Source: The Green Grid

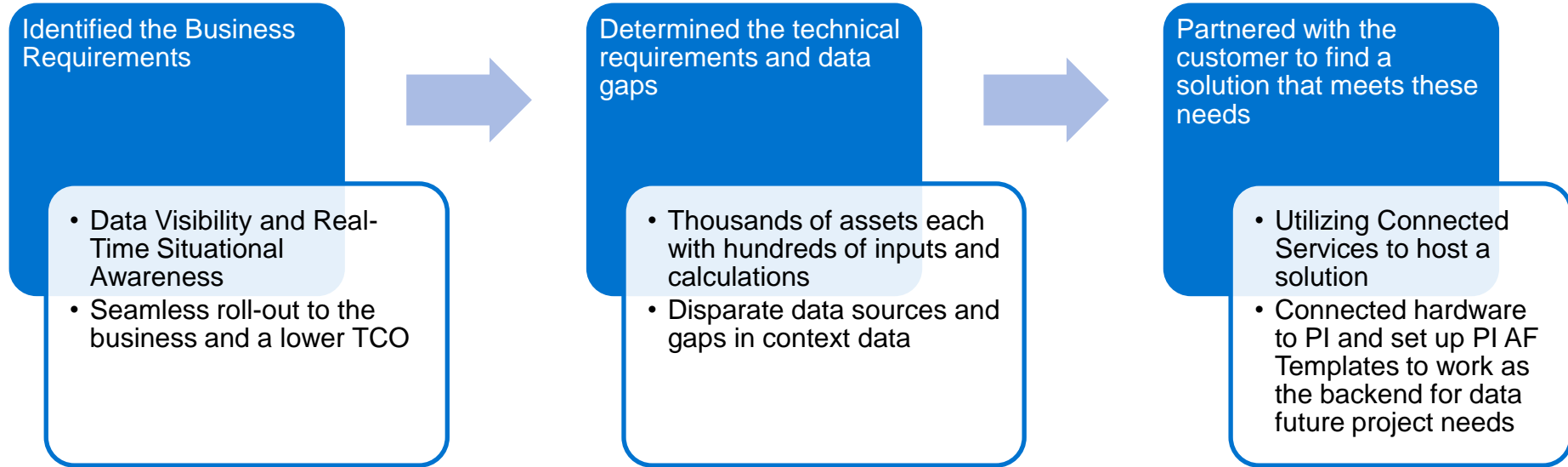
Challenges with Data Points: Infrastructure



Other challenges with Data Points

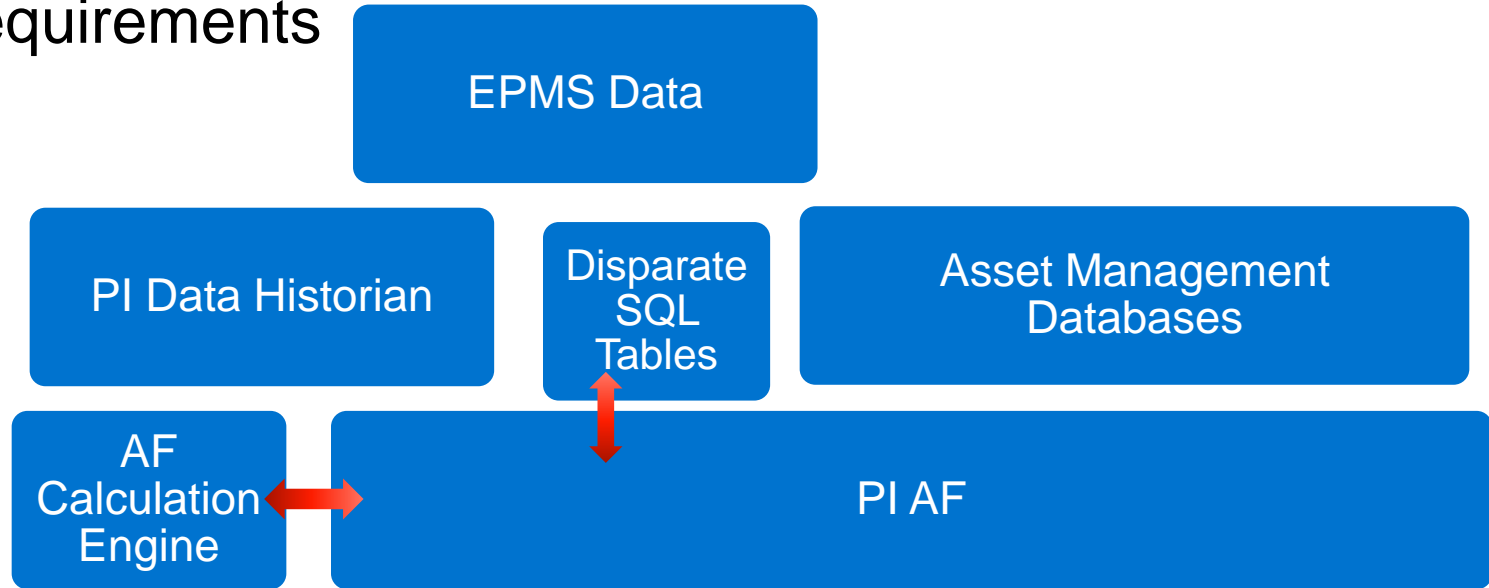
- PUE calculations can become very complex anytime power leaves or enters a boundary.
- DLR colocation teams had to manually take down data every week.
- Data tracking tool was based in excel.

Approach



Approach – A solution infrastructure

- We needed a platform that could handle these requirements



Data Structuring Model

- Worked with Digital Realty to understand data requirements.
- Developed a templated data model in PI AF to help with tag consistency, situational awareness, and reporting

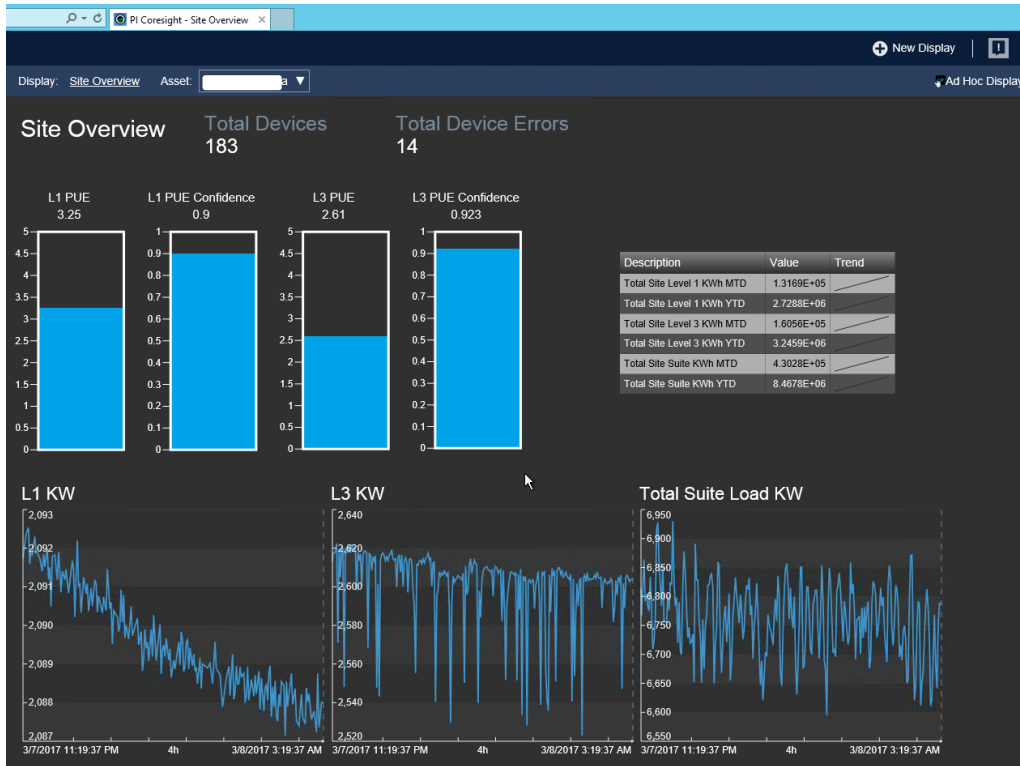
NYC2: Suite
RCM

Category: Context

Base Power Circuit ID	ID For position 1 o...	0	'..\ Start Position ID';
BasePath	OPC tag path of th...	None	'Building';";'Suite';";'\. \De
Building	Location		SELECT Building FROM [EDW_Lu
Channel	Name of Channel		SELECT Path FROM ChannelRe
Circuit ID	Identifier for all ot...	0	A=Base Power Circuit ID;B=Ch
Customer	Customer Name	None	SELECT CustomerName FROM
EquipmentName	Which Measureme...	0	SELECT [Device Name] FROM []
ID	Unique Identifier f...	0	SELECT Id FROM [NYC_Cust_C
Is_Available	Is this pole Available	0	
Number of Poles	How Many poles is ...	0	SELECT NumPoles FROM [NYC_
PanelType	Base Channel Refe...	0	
Secondary Channel	Name of Channel (...	0	A=ChannelNumber;[A+2]
Sold Amps	How many amps h...	0	SELECT [MLOAD_AMPS_A] FRC
Start Position ID	Position of Channe...	0	SELECT PowerCircuitId FROM []
Suite	Physical Location o...		SELECT [Physical Location] FRC
Tertiary Channel	Name of Channel (...	0	A=ChannelNumber;[A+4];max
Voltage	Breaker Applied Vo...	0 V	SELECT Volts FROM [NYC_Cust

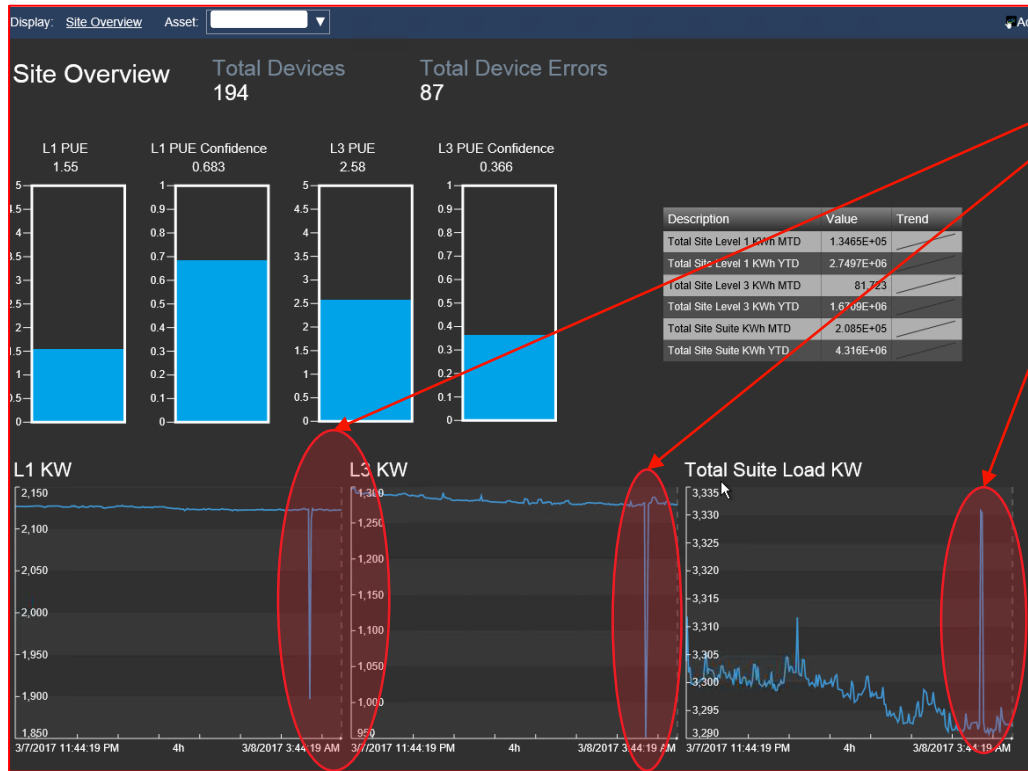
Rectifier
UPS

Data Visibility and Reporting



- Utilized data from calculations in PI AF in PI Coresight

Data Visibility and Reporting



Visualize and alert on sudden changes in load

- See this for any Suite in the portfolio

Data is structured and available down to the Channel level

Column2	1 Pole Available	2 Poles Available	3 Pole Available
NYC2: : RPP_101 Panel 5B\Channels\Channel01	Available		
NYC2: : RPP_101 Panel 5B\Channels\Channel37	Available	Available	Available
NYC2: : RPP_101 Panel 5B\Channels\Channel39	Available	Available	
NYC2: : RPP_101 Panel 5B\Channels\Channel41	Available		
NYC2: : RPP_101 Panel 5B\Channels\Channel42	Available		
NYC2: : RPP_101-D\Channels\Channel14	Available		
NYC2: : RPP_101-D\Channels\Channel37	Available	Available	Available
NYC2: : RPP_101-D\Channels\Channel39	Available	Available	
NYC2: : RPP_101-D\Channels\Channel41	Available		
NYC2: : RPP_101-D\Channels\Channel42	Available		
NYC2: : RPP_101E\Channels\Channel17	Available		
NYC2: : RPP_101E\Channels\Channel25	Available	Available	Available
NYC2: : RPP_101E\Channels\Channel27	Available	Available	Available
NYC2: : RPP_101E\Channels\Channel29	Available	Available	Available
NYC2: : RPP_101E\Channels\Channel31	Available	Available	Available
NYC2: : RPP_101E\Channels\Channel33	Available	Available	Available
NYC2: : RPP_101E\Channels\Channel35	Available	Available	Available
NYC2: : RPP_101E\Channels\Channel37	Available	Available	Available
NYC2: : RPP_101E\Channels\Channel39	Available	Available	
NYC2: : RPP_101E\Channels\Channel41	Available		
NYC2: : RPP_101-G\Channels\Channel20	Available		
NYC2: : RPP_101-G\Channels\Channel29	Available		
NYC2: : RPP_101-G\Channels\Channel36	Available	Available	Available
NYC2: : RPP_101-G\Channels\Channel38	Available	Available	Available
NYC2: : RPP_101-G\Channels\Channel40	Available	Available	
NYC2: : RPP_101-G\Channels\Channel42	Available		
NYC2: : RPP_102E\Channels\Channel17	Available		
Total	61.81		

- Reports filtered by Panel, kW, Customer or any other parameter.
- Quick Views on Pole Availability

Next Steps

- Automatic PI AF Updates for physical changes
- OSIsoft PI Integrator for Business Analytics
 - Phase Balancing
 - Cooling Zone Modeling
 - Sq. Footage Accounting

Goal

The ability to collect, aggregate, normalize, analyze, and present data center operations and asset performance information across portfolio.

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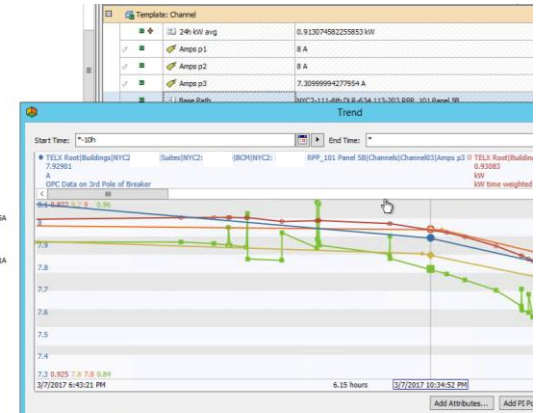
Summary

COMPANY and GOAL

Digital Realty aims to collect, normalize, and store high fidelity real-time and history-based data across multiple colocation facilities.



DIGITAL REALTY



CHALLENGE

Infrastructure challenges and integrating a variety of upstream and downstream data systems for centralized visibility.

- 19/21 facilities in portfolio are landlord owned, resulting in data visibility & data acquisition challenges.
- IT security restrictions.

SOLUTION

Connected services from OSISOFT and Casne made bringing in millions of data points from a variety of sources sensible

- A hosted solution with data storage and full integration to all equipment
- Not held back by data point counts or point license limitations

RESULTS

An infrastructure platform that makes finding data across multiple colocation facilities simple

- Time Savings (over 50%) in viewing reports
- Cost savings in identifying and alerting on problems earlier
- Multi-use tool
- Reduction of manual editing
- Immediate data availability

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Questions

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State your **name & company**

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谢谢

Danke

Merci

Gracias

Thank You

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Спасибо

Obrigado