OSIsoft. USERS CONFERENCE 2011

Controlling DC Data Exhaust

3-D Visualization and Integration of Data Center Monitoring Systems Utilizing the PI System and PI AF

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Collecting, Aggregating, and Analyzing Data Exhaust

Print
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by Ben Lorica | @dliman | Comments: 1 | 14 January 2010

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Next week, O'Reilly's Research Director Roger Magoulas, will lead an exciting panel discussion on Big Data†. The focus will be on the piles of data that companies have been collecting, and are just beginning to analyze:

> The internet and social media create a mountain of random, unstructured, and at times ephemeral data by-products, which may appear to be trash. Yet, one person's trash is another's treasure. From FaceBook to Netflix, people are spending more time sharing their thoughts, opinions, plans and perspectives as they socialize and conduct business online. With each of these Internet exchanges traces of information,or Data Exhaust, are left behind. When correlated or combined, these snippets can provide insight into political views, professional achievements, purchasing behaviors, and demographic information—pinpointing trend setters and leading indicators. Brilliant innovators now re-purpose this data stream, aggregating and analyzing the data to provide new products or services.

Next Tuesday's panel discussion and networking event will be held at the Stanford Business School. Further details are available on the VLAB web site.

(†) Recent Radar posts on Big Data: (1) Counting Unique Users in Real-time with Streaming Databases, (2) Pipelining

http://radar.oreilly.com/2010/01/collecting-aggregating-analyzing-data-exhaust.html

This isn't new…

OSIsoft has been doing this for more then 25 years…

Abstract

We discuss the use of the PI System to present a holistic view of critical facilities and data centers, including mechanical and electrical gear, as well as IT assets, such as servers, storage devices, and routers.

Attend this session to see how PI data can complement and drive an interactive display utilizing detailed 3-D models. All major assets are visible and searchable in a building information model (BIM) granting ready access to a knowledge library, including manuals, maintenance documentation, commissioning forms, and others. We leverage PI AF to access the PI System, show point histories, correlate with other KPI's and generate color-coded overlays on objects in the 3-D model.

The presentation will address PI WebParts embedded in integrated SharePoint portals, together with Excel and Visio integrations, a delivery form that becomes more and more common amongst data center clients. We will demonstrate integrations with industry specific asset management systems, including alarm triggered workflows and generation of work tickets feeding off of live PI data.

Agenda

1. The Role and Foot Print of the PI System in a Mission Critical Facility
2. The Value Proposition of a Good Integration: Central vs. Dispersed Data
3. The PI System on Steroids – the Case for PI AF
4. MS SharePoint has become the Delivery Medium of Choice
5. Leveraging Business Intelligence (BI) Applications
6. Leveraging Building Information Modeling (BIM)
7. DC Weather Forecast – mostly CLOUDy

1. The PI System in a Mission Critical Facility

How many servers for an app? Which ones?
How many per user / per tweet / per post…

Mmmmm scallops for dinner in Tokyo http://bit.ly/cmgiT2 tasteeee.... =)
2 days ago

I'm at SFO United Airlines to Tokyo. http://4sq.com/cmgzK7
3 days ago

SFO NRT HND GMP HKG NRT SFO My next couple weeks
3 days ago

@ebenhewitt no but I could send you the deck if you want... fun talk about actual buildings architecture (!)
5 days ago

@ev on Twitter business model "I checked the couch cushions and there was only 90 cents in there." #funny http://bit.ly/a3sbWy
5 days ago

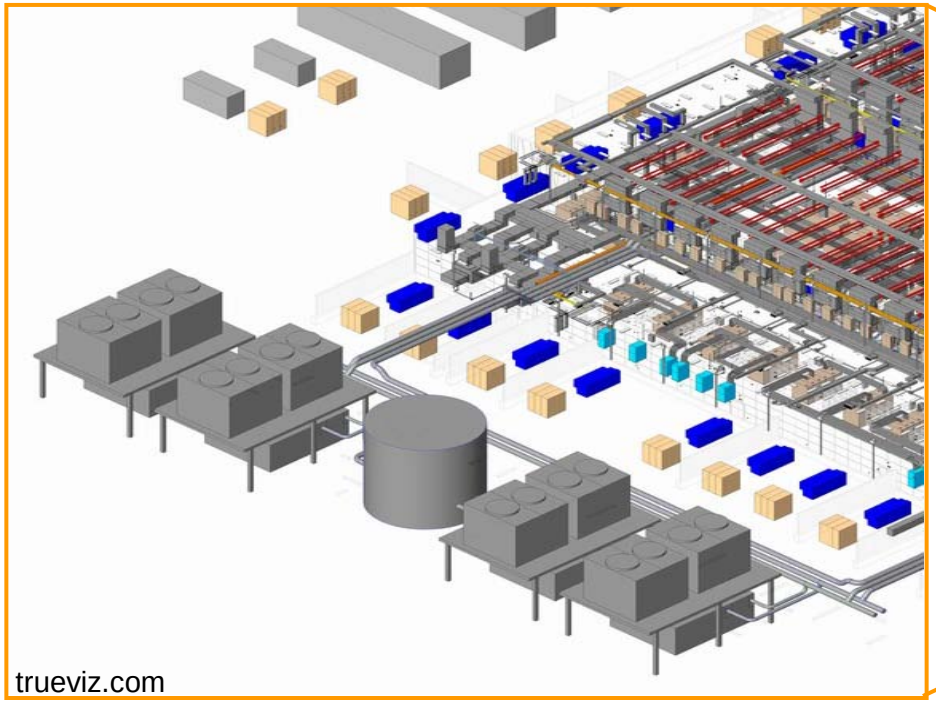
@SkipFleshman Microsoft has more motive to be evil, but Google has more opportunity/temptation :{>
5 days ago

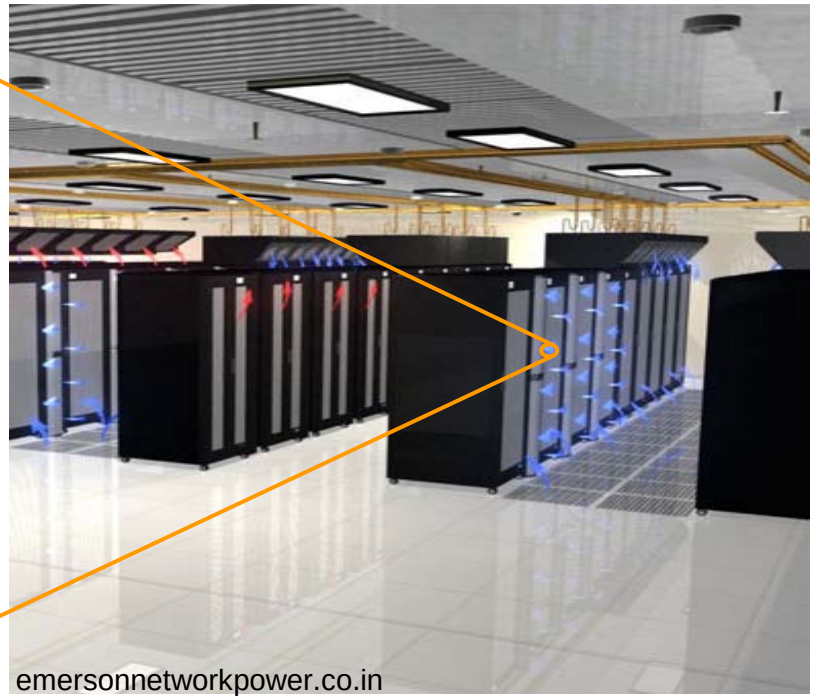
Halliburton :{>
Microsoft :{> Apple :{>

twitter miko.com

1. The PI System in a Mission Critical Facility

How many CRACs for a server? What kind of servers?
How many per Chiller / per UPS / per PDU…

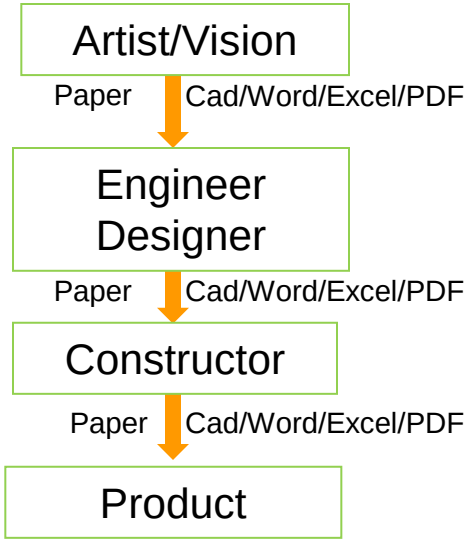




2. Central vs. Dispersed Data

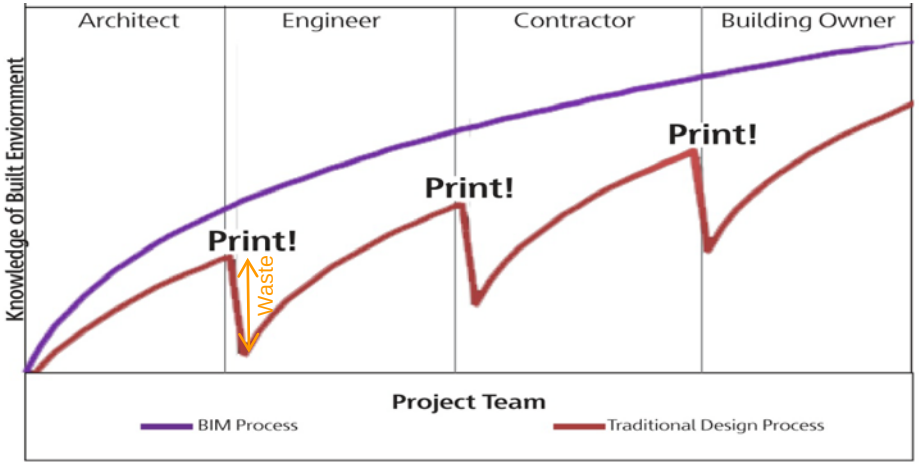
Old Universal Paper Based Communication

Example: Construction Industry



Positives:
- It works

Negatives:
- Not efficient
- Wasteful
- Does not scale



2. Central vs. Dispersed Data

Structured Integrated Communication

Examples: Automotive, Aero-Space, Ship Building, Frank O. Gehry, SAP

Positives:
- Very efficient
- Digitally Life Cycle
- Highly Automated

Negatives:
- Highly specialized
- Expensive
- Un-flexible, as in “addictive”
- Locking-in of solutions and providers

Vision Studies

Catia

Engineer Designer

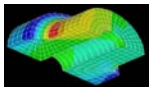
Catia

Constructor

Catia

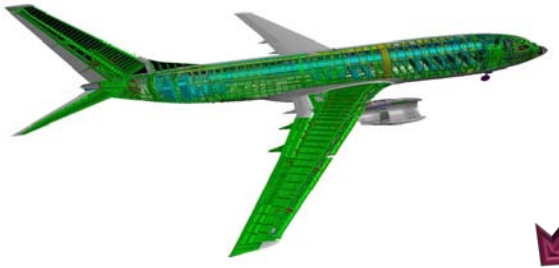
Fabrication (Digital)

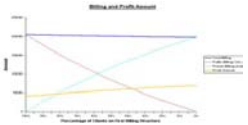
Product



FEM Analysis

CFD





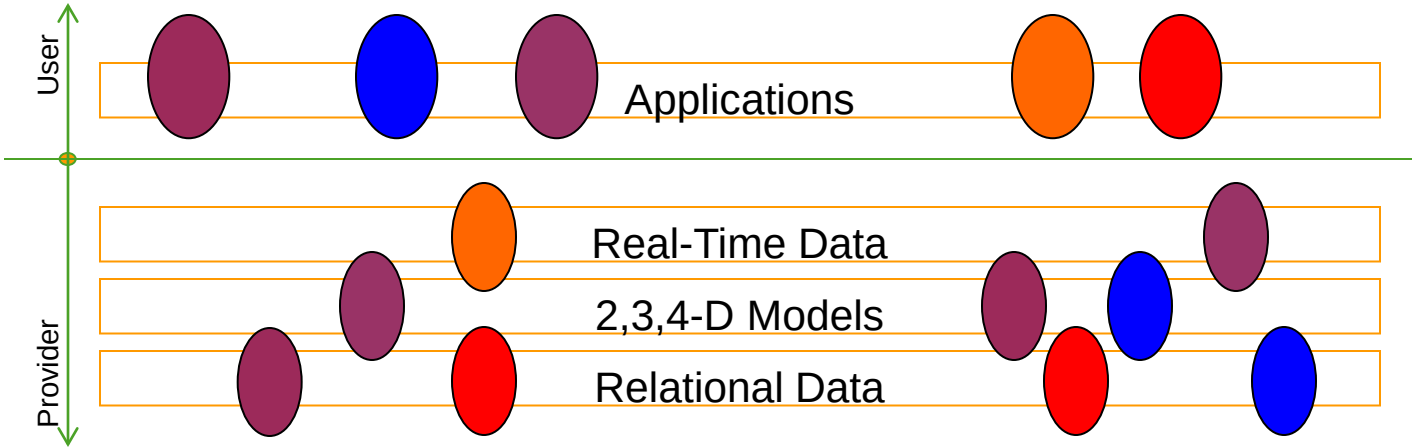
BOM

Aircraft Assembly

2. Central vs. Dispersed Data

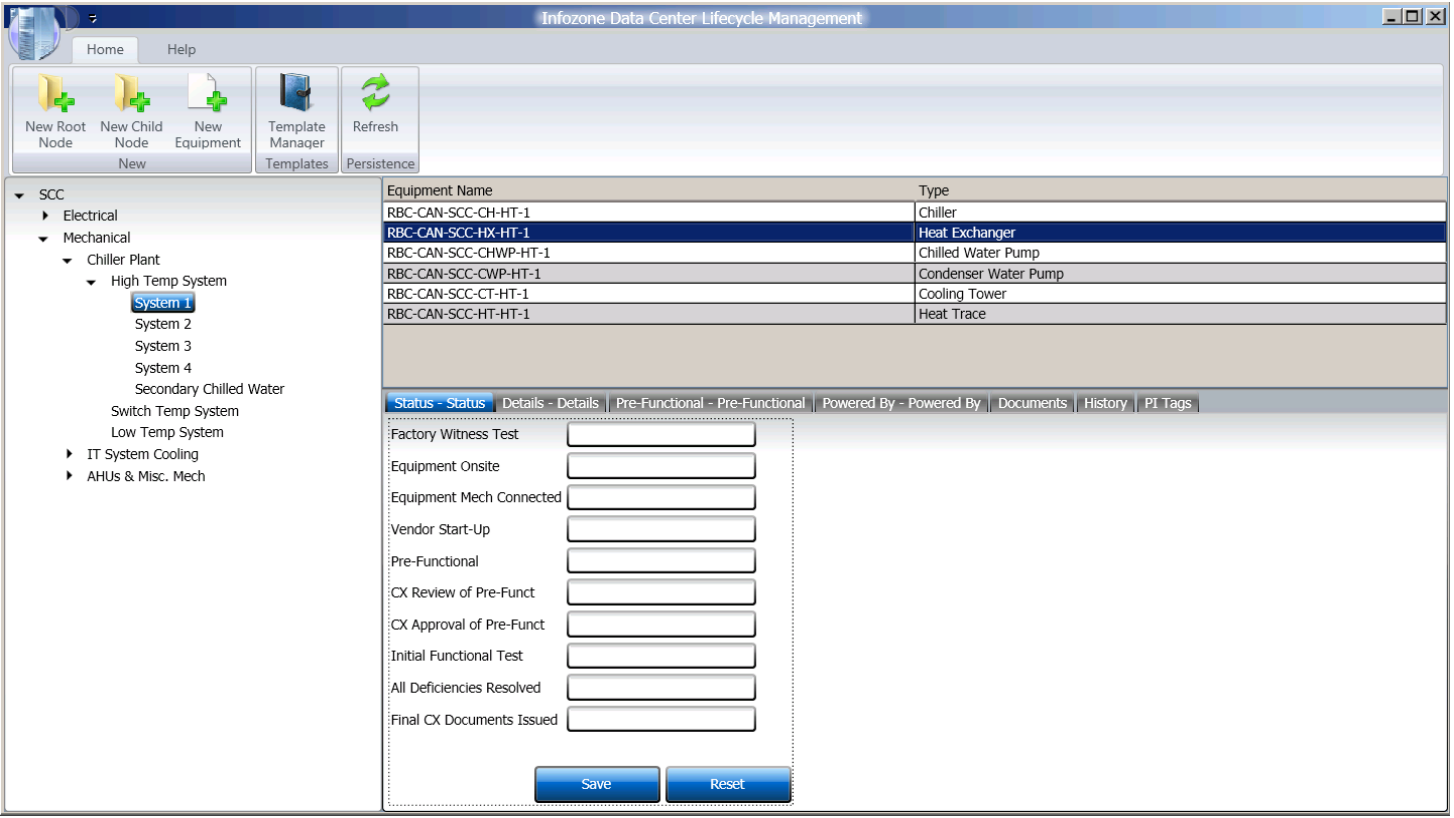
Communications based on APIs, Mash-ups, Perpetual Beta

Example: Modular Bikes in Asia, Modern Chip Design, BIM, Search, Semantic Modeling



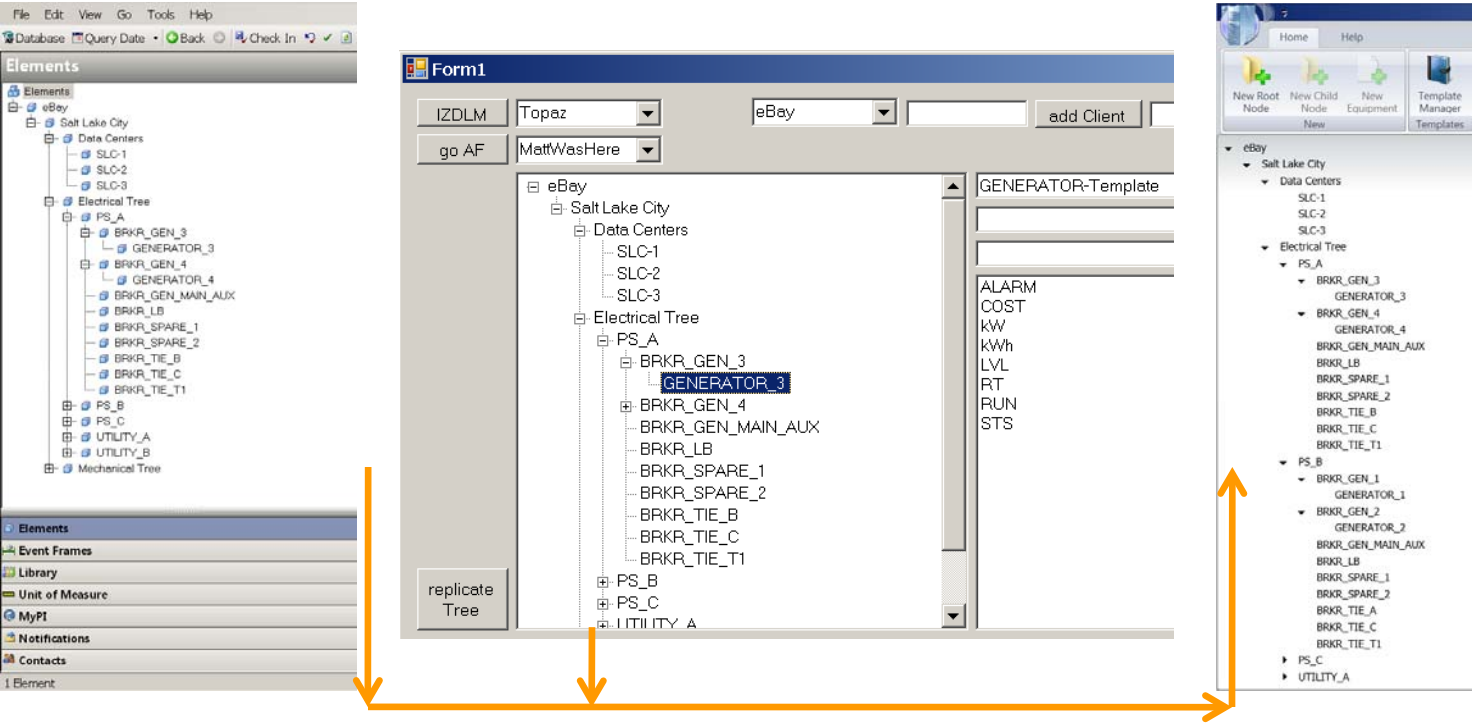
Positives:
- Breeds Innovation
- Very Flexible
- Easily Distributed
- Virtualized
- Streamlines by keeping information where it belongs
- Inter-disciplinary

3. The PI System on Steroids – The Case for PI AF



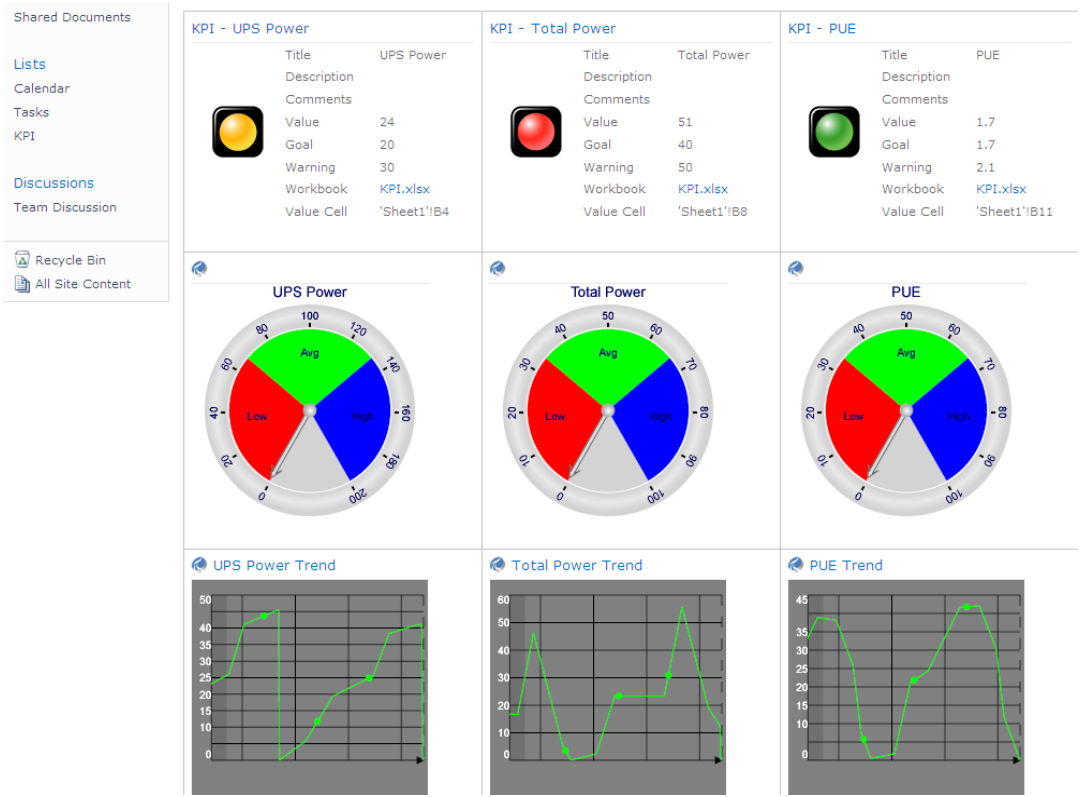
Other asset tools also differentiate between equipment types – as PI AF templates do.

3. The PI System on Steroids – The Case for PI AF



This allows for integration and interoperability.

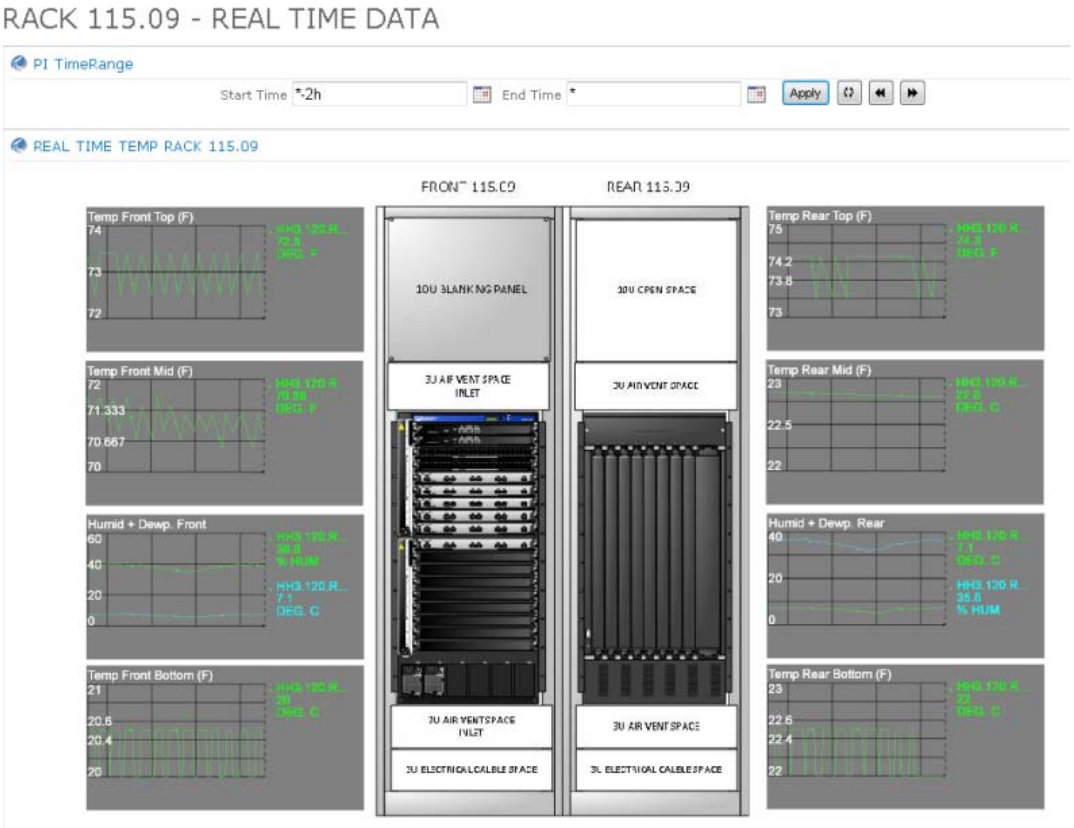
4. MS SharePoint is the Delivery Medium



Most modern asset management tools are consumed through www-like interfaces.

PI WebParts fit well into this delivery method.

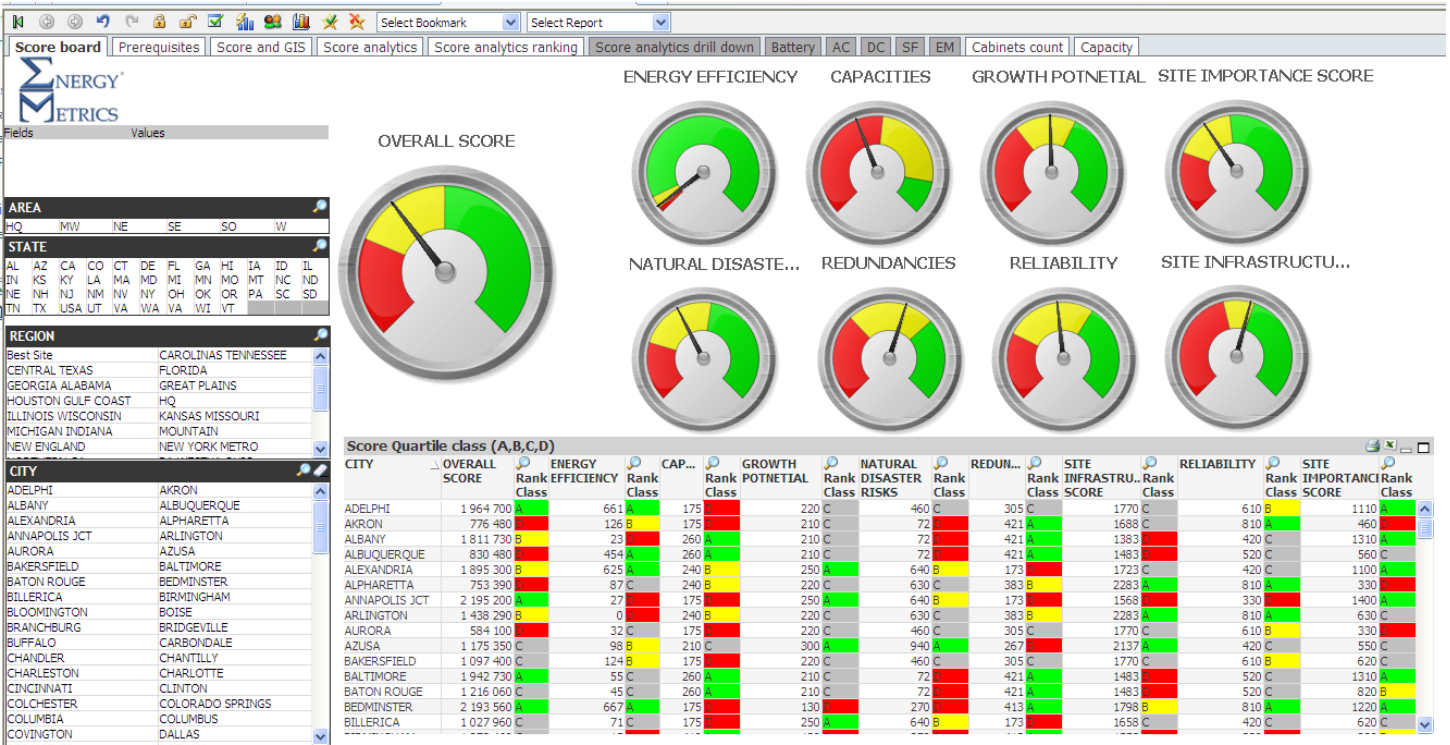
4. MS SharePoint is the Delivery Medium



IT components with data from PI System.

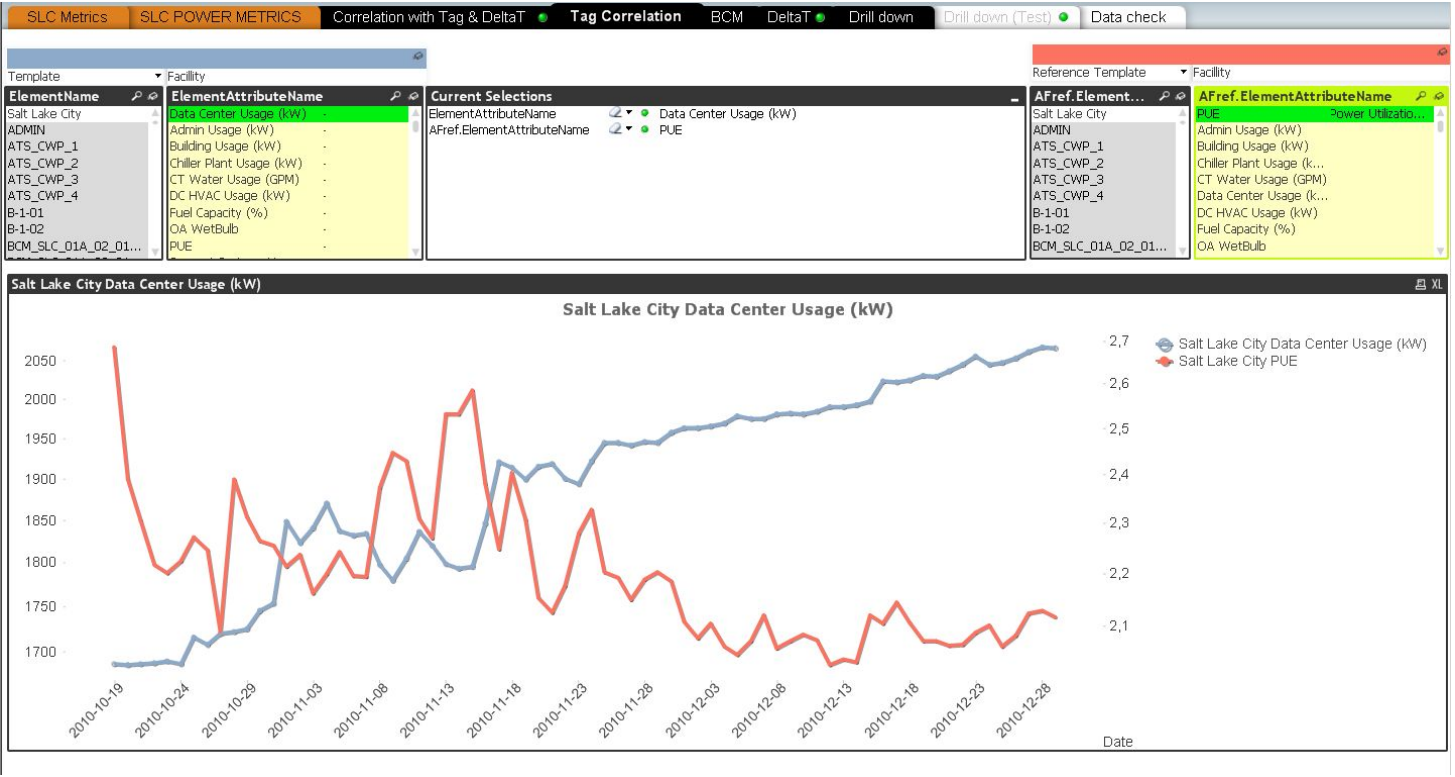
DCIM – converged DC.

5. Different Levels of Granularity



Leverage data on executive level.

5. Different Levels of Granularity



Allow a creative and playful approach to data.

5. Different Levels of Granularity

Dash boarding (real time layer) as link into trends and histories (archive layer).

5. Different Levels of Granularity

SLC Metrics | SLC POWER METRICS | Correlation with Tag & DeltaT | Tag Correlation | BCM | DeltaT | **Drill down** | Drill down (Test) | Data check

SLC Total

	Admin Usage (kW)	Building Usage (kW)	Chiller Plant Usage (kW)	CT Water Usage (GPM)	Data Center Usage (kW)	DC HVAC Usage (kW)	Fuel Capacity (%)	OA WetBulb	PUE	Support Systems Usage (kW)
Trend										
AVG	263,045	3172,886	219,621	1,092	1897,994	330,407	78,507	40,661	2,286	156,149

Date

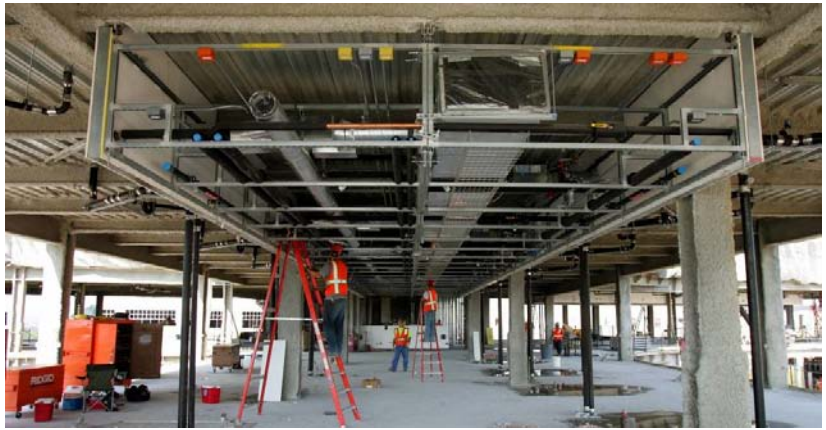
2/1/2011	1/1/2011	31/12/2010	30/12/2010	29/12/2010	28/12/2010	27/12/2010	26/12/2010	25/12/2010	24/12/2010	23/12/2010	22/12/2010	21/12/2010	20/12/2010	19/12/2010	18/12/2010	17/12/2010	16/12/2010	15/12/2010	14/12/2010	13/12/2010
12/12/2010	11/12/2010	10/12/2010	9/12/2010	8/12/2010	7/12/2010	6/12/2010	5/12/2010	4/12/2010	3/12/2010	2/12/2010	1/12/2010	30/11/2010	29/11/2010	28/11/2010	27/11/2010	26/11/2010	25/11/2010	24/11/2010	23/11/2010	22/11/2010
21/11/2010	20/11/2010	19/11/2010	18/11/2010	17/11/2010	16/11/2010	15/11/2010	14/11/2010	13/11/2010	12/11/2010	11/11/2010	10/11/2010	9/11/2010	8/11/2010	7/11/2010	6/11/2010	5/11/2010	4/11/2010	3/11/2010	2/11/2010	1/11/2010
31/10/2010	30/10/2010	29/10/2010	28/10/2010	27/10/2010	26/10/2010	25/10/2010	24/10/2010	23/10/2010	22/10/2010	21/10/2010	20/10/2010	19/10/2010	18/10/2010	17/10/2010	16/10/2010	15/10/2010	14/10/2010	13/10/2010	12/10/2010	11/10/2010

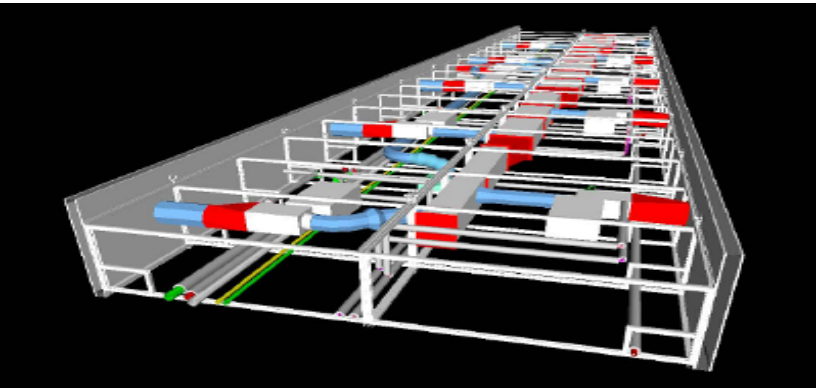
Avg (DailyAverage)

Load Catagory	Service	Equipment Type	ElementName	Attribute	Date	2/1/2011	1/1/2011	31/12/20 10	30/12/20 10	29/12/20 10	28/12/20 10	27/12/20 10	26/12/20 10	25/12/20 10	24/12/20 10	23/12/20 10	22/12/20 10	21/12/20 10	20/1 2/20
ADMIN						148,4	148,5	147,3	147,0	118,3	136,0	136,3	137,5	137,3	136,5	135,1	128,2	125,7	12
Data Center						-	-	-	-	239,1	239,1	238,9	238,9	239,7	237,9	242,3	242,9	241,9	24
Generator						-	-	-	-	1 706,5	43,5	43,5	65,3	65,3	65,3	65,3	65,2	65,1	6
HVAC DC						36,2	36,2	36,8	37,4	38,8	45,2	45,1	45,0	45,5	45,8	47,3	47,9	47,4	4
	Electric...					-	-	-	-	43,3	43,3	43,3	43,5	43,4	43,4	43,5	43,4	43,4	4
	HVAC ...					-	-	-	-	29,1	34,8	35,5	36,1	36,2	36,2	37,1	36,6	36,2	3
		Constant Volum...				-	-	-	-	-	-	-	-	-	-	-	-	-	
		Basin Filter				-	-	-	-	-	-	-	-	-	-	-	-	-	
				CEWT		-	-	-	-	40,3	42,3	43,4	45,5	45,2	44,4	46,9	45,9	43,9	4
				CLWT		-	-	-	-	39,9	42,8	44,2	45,5	47,4	44,6	46,8	45,9	44,4	4
			CT-1-01	kW		-	-	-	-	-	-	-	-	-	-	-	-	-	
				SPD		-	-	-	-	-	-	-	-	-	-	-	-	-	
HVAC Support				STS		-	-	-	-	-	-	-	-	-	-	-	-	-	
	HVAC Plant 1	Cooling Tower		CEWT		-	-	-	-	40,9	44,4	45,6	48,2	48,5	46,9	49,7	48,4	46,2	4
				CLWT		-	-	-	-	42,1	44,9	45,9	47,7	49,7	46,8	49,3	48,0	46,4	4
			CT-1-02	kW		-	-	-	-	-	-	-	-	-	-	-	-	-	
				SPD		-	-	-	-	-	-	-	-	-	-	-	-	-	
				STS		-	-	-	-	-	-	-	-	-	-	-	-	-	
		Heat Trace				-	-	-	-	1,0	-	-	-	-	-	-	-	-	
				CEWT		-	-	-	-	53,1	51,6	51,9	52,7	53,2	54,4	57,8	54,1	56,7	5
		Heat Exchanger	HX-1-01	CHWEWT		-	-	-	-	62,1	61,9	62,1	62,6	61,7	62,2	62,0	61,6	61,5	6
				CHWGPM		-	-	-	-	1,9	2,5	0,1	0,3	1,7	2,3	2,4	2,4	4,5	

Systematic attribute based drill down into metrics on a point by point level.

6. Building Information Modeling (BIM)





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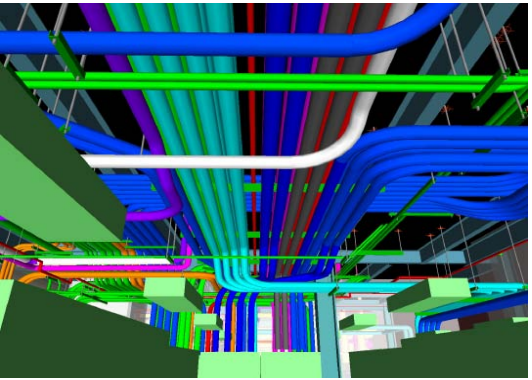




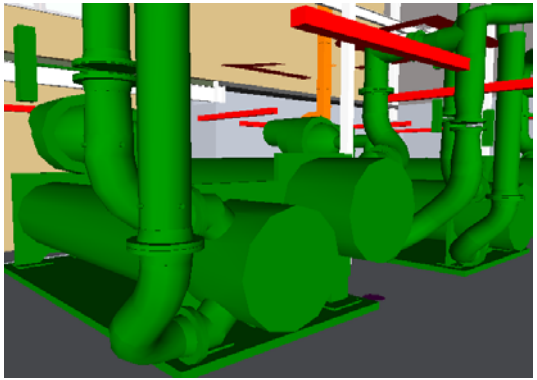

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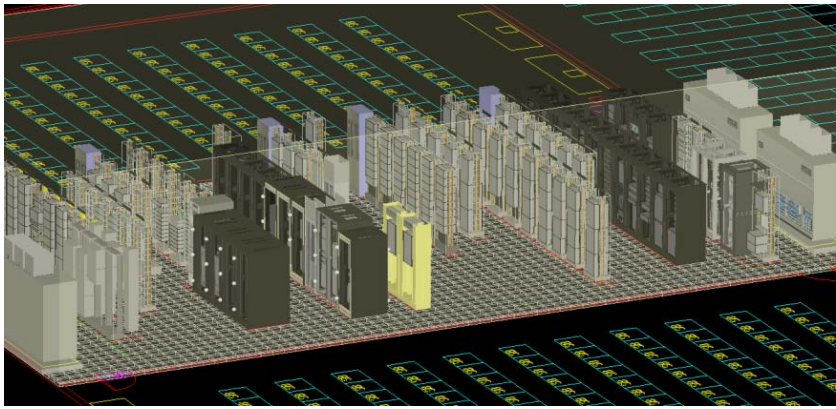

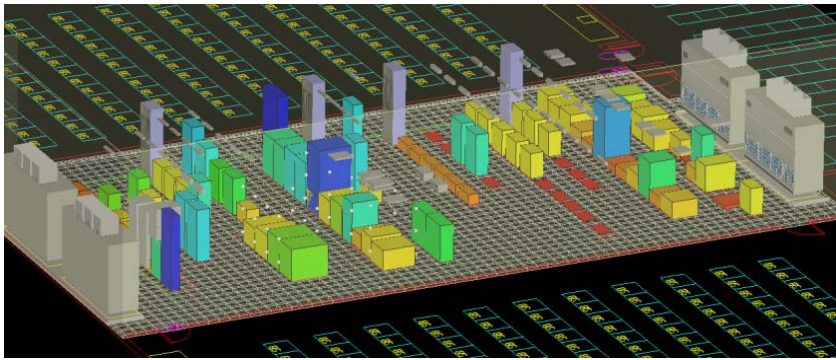

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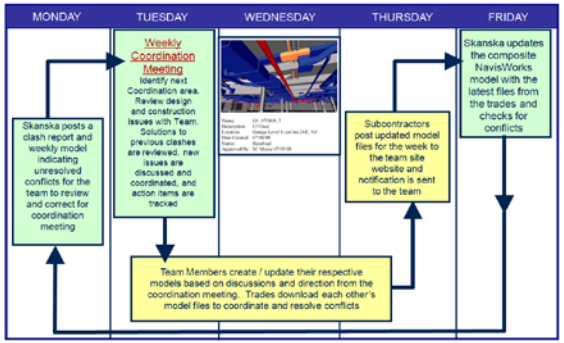
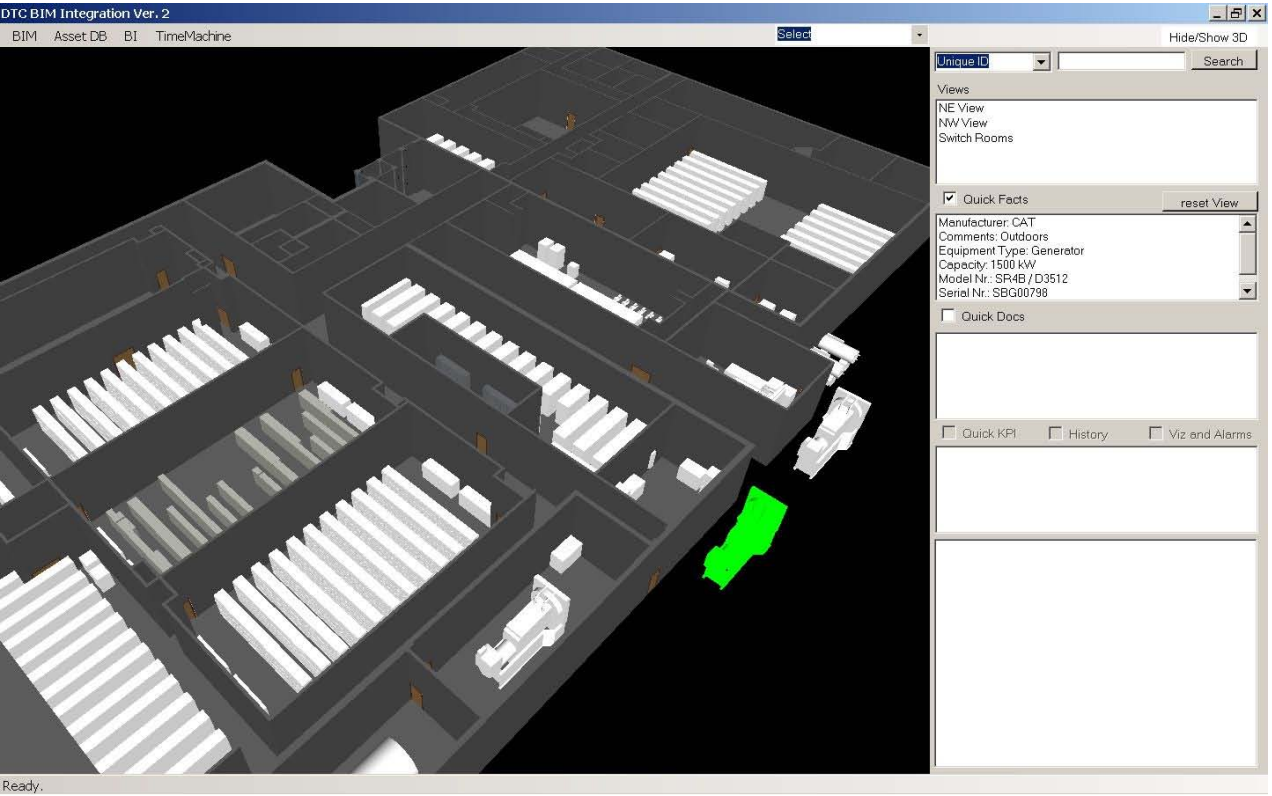


BIM technology on construction sites.

6. Building Information Modeling (BIM)

Up Next: Portable PI Systems for Commissioning.

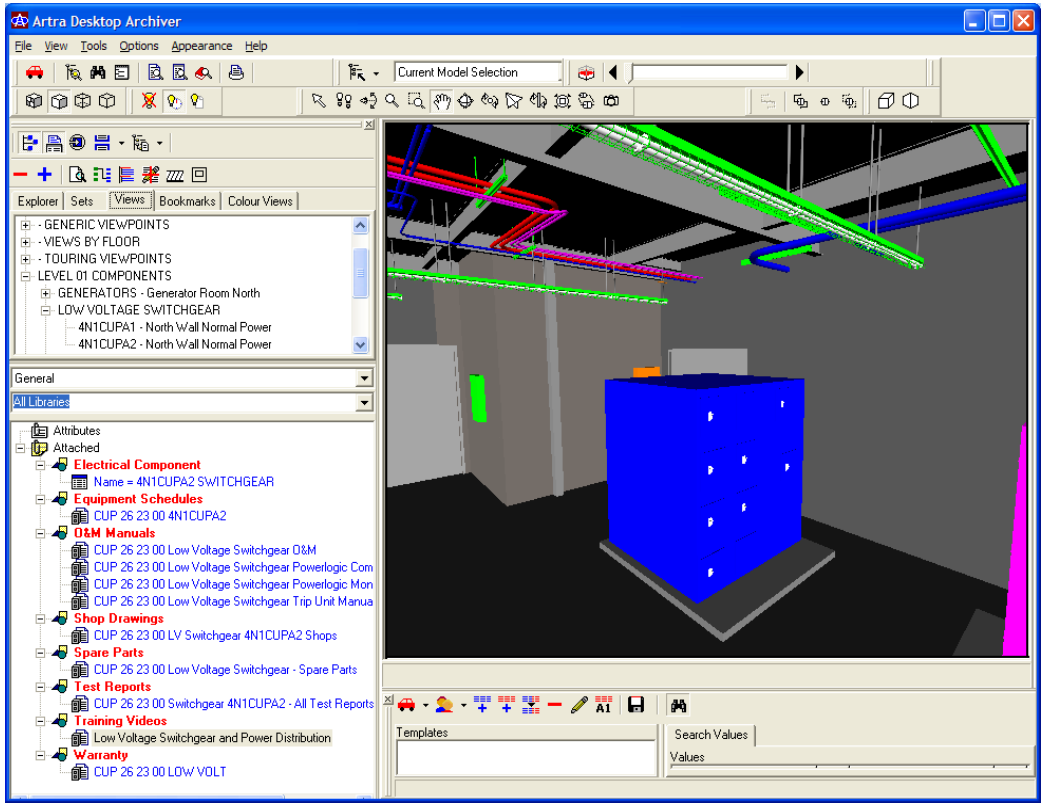
6. BIM Portal – Database Connectivity



BIM technology can help to manage facilities.

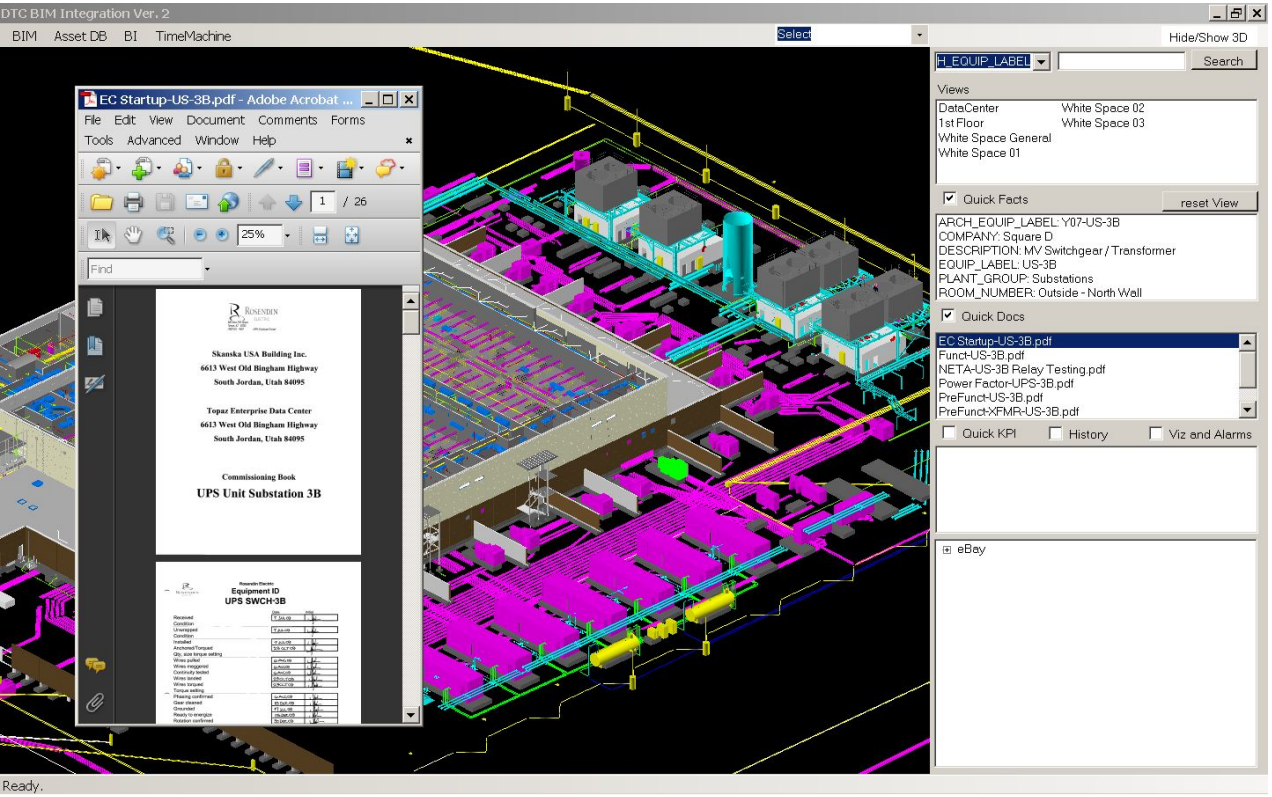
Clearly communicates location of equipment and spatial context. Basic attributes and views in facility model.

6. BIM Portal – Knowledge Library



- Manuals
- Videos
- Training
- Maintenance
- Commissioning
- Performance
- Spreadsheets
- Hyperlinks

6. BIM Portal – Knowledge Library



- Manuals
- Videos
- Training
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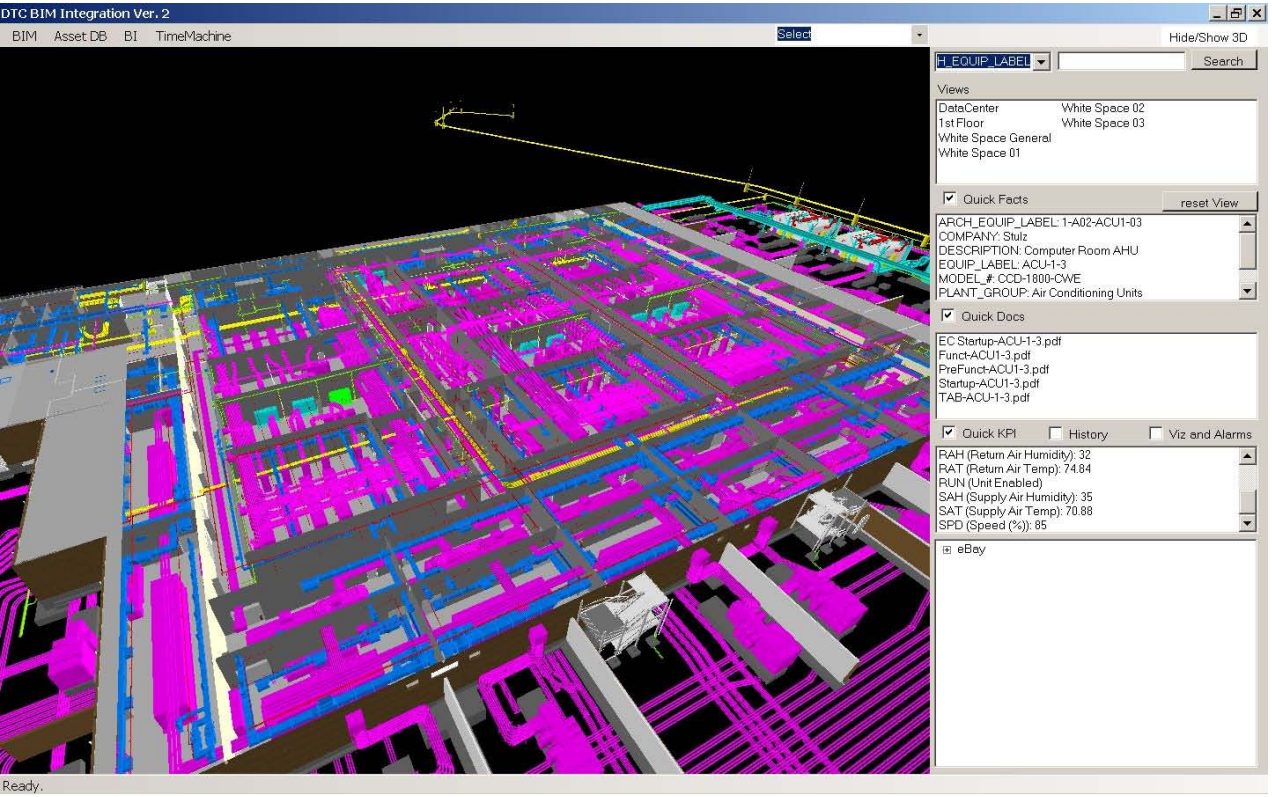
- Hyperlinks

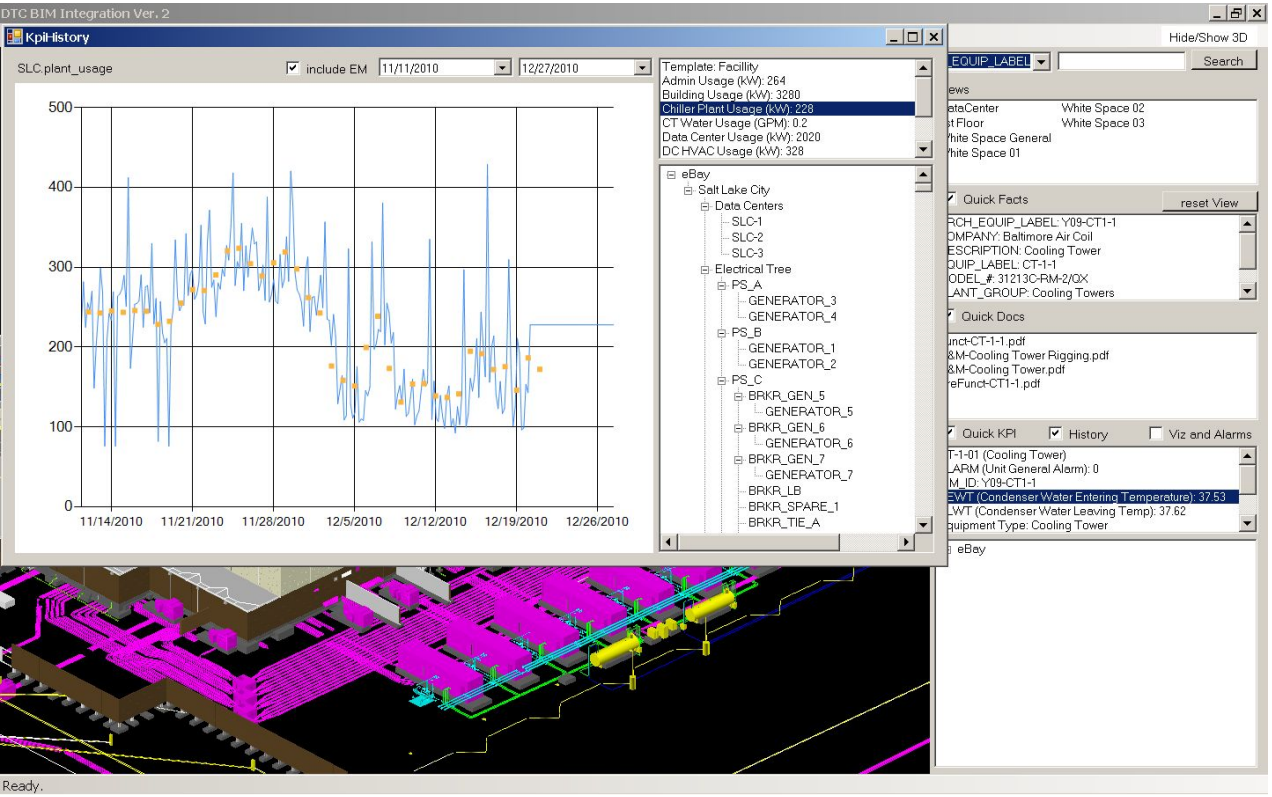
6. BIM Portal – PI Data



BIM technology can link into PI System.

Use PI AF templates with static and point attributes to establish mapping to facility equipment.

6. BIM Portal – Apps

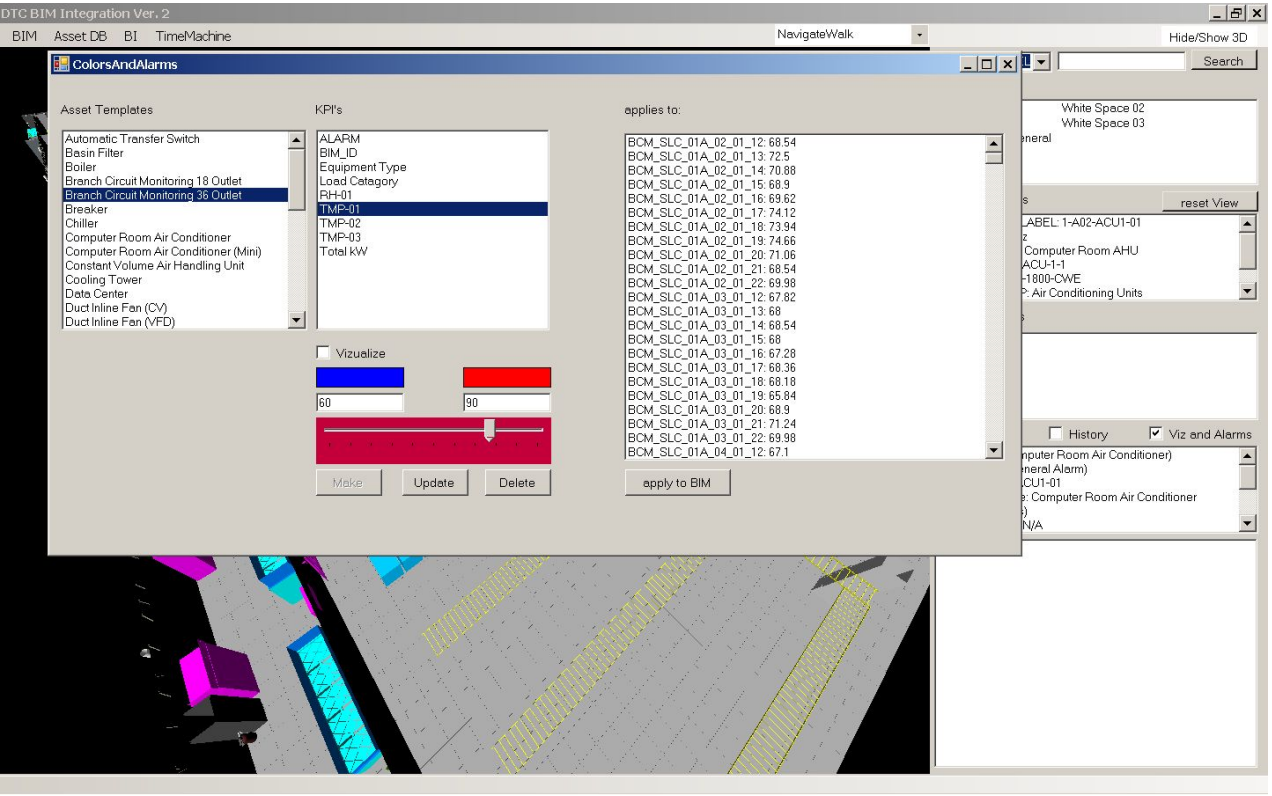


Extend infrastructure:

Use PI tools or 3rd party technologies to show history data and trends.

Forecasting, trend fitting, include other time series data sources.

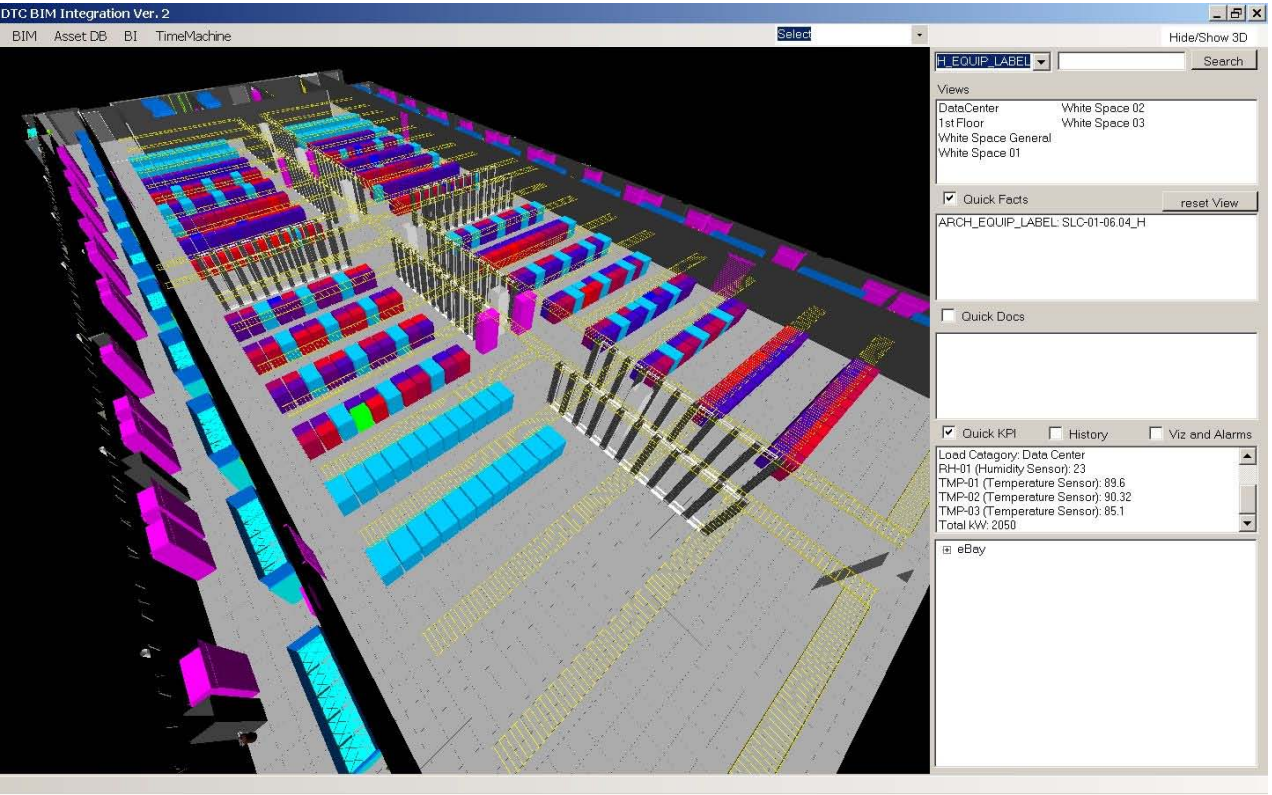
6. BIM Portal – Apps



Extend infrastructure:

Use PI AF to access KPI's for equipment linked in BIM system to overlay real-time data.

6. BIM Portal – Apps

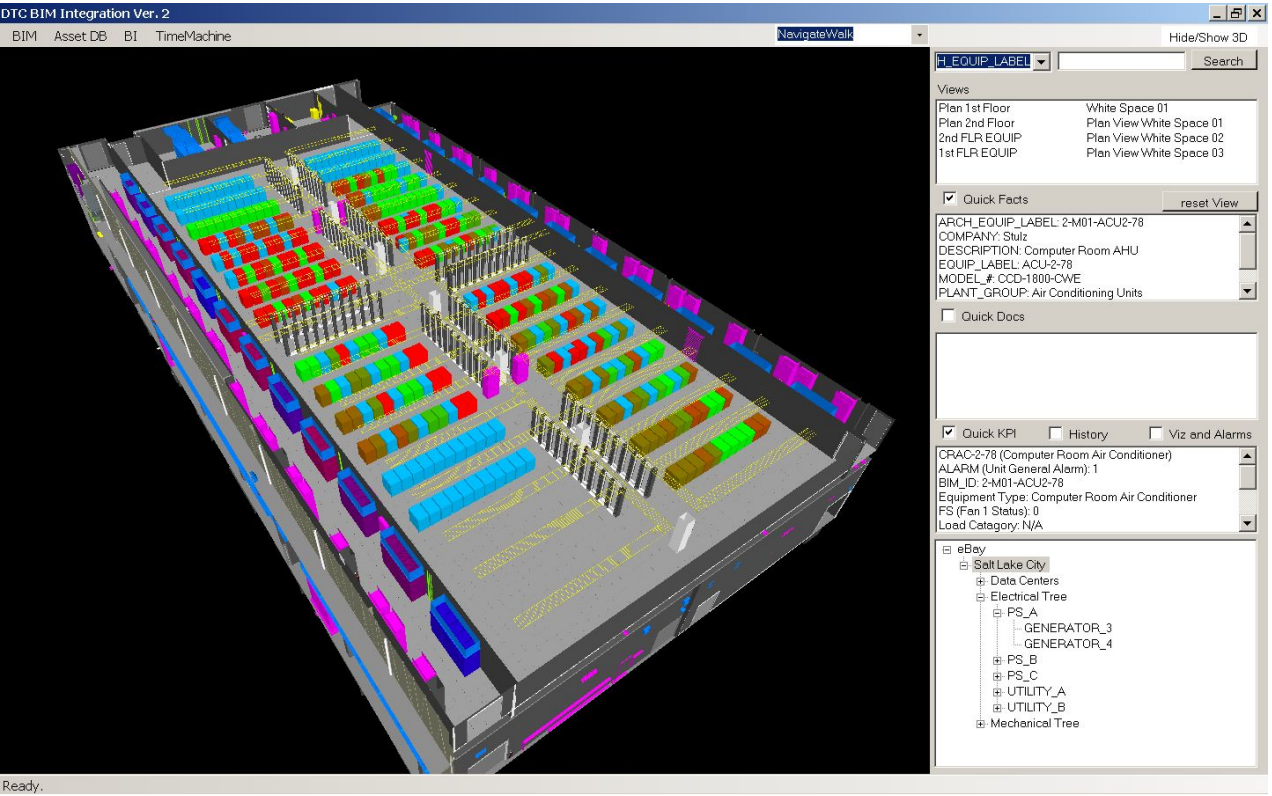


Extend infrastructure:

Use PI AF to access KPI's for equipment linked in BIM system to overlay real-time data.

- Temperatures on IT racks.

6. BIM Portal – Apps

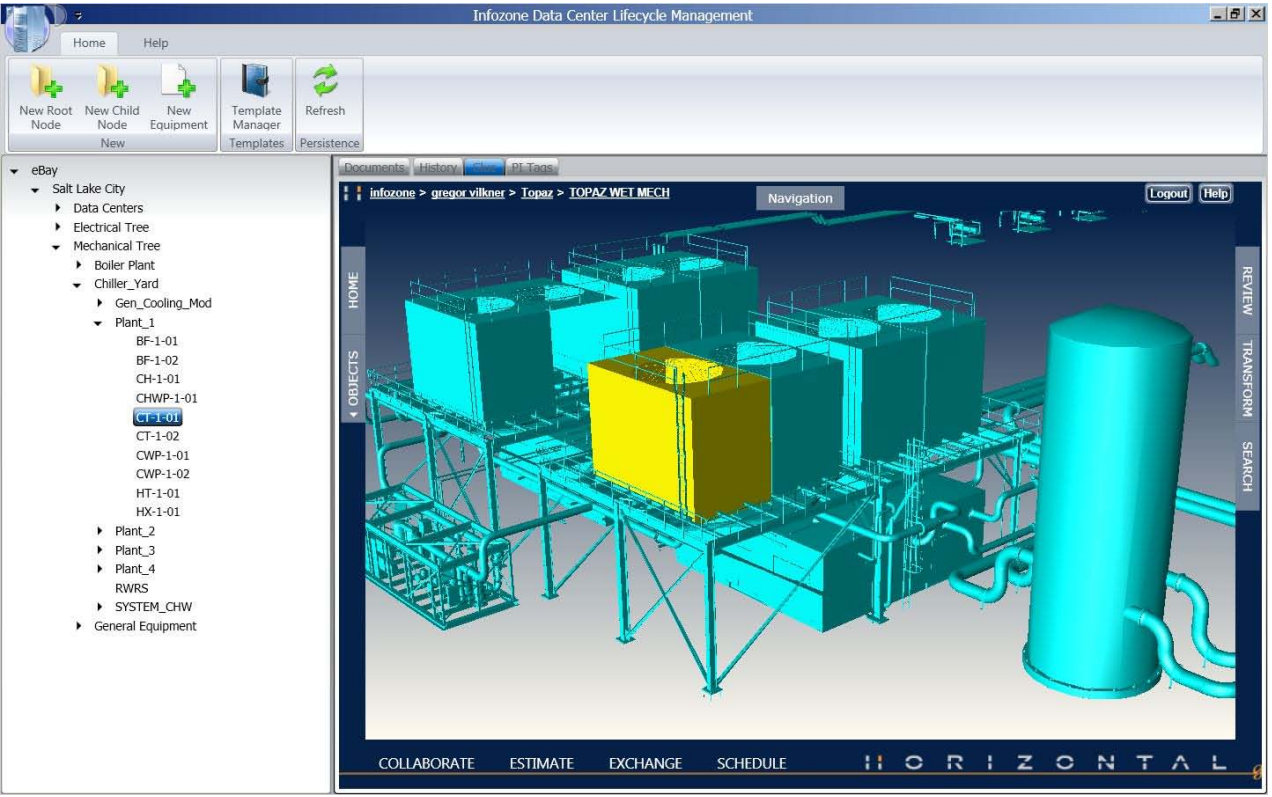


Extend infrastructure:

Use PI AF to access KPI's for equipment linked in BIM system to overlay real-time data.

- kW consumed per rack.

6. BIM Portal – Alarming



BIM technology can link into PI Notification system.

Use PI System to make web service calls and communicate alarm status via 3-D facility model.

7. DC Weather Forecast – Mostly CLOUDy

Critical Power	Cost Per mW	PUE	# Servers	NPV 10%	NPV Per Server	Utilization	Private Cloud
10	20	1.70	20,000	561,836,431	28,092	1X	
10	12	1.15	20,000	313,667,108	15,683	4X	3,921

1. DataCenters will be fully stacked.
2. DataCenters will be fully virtualized.
3. DataCenters will grow on demand.
4. DataCenters will be autonomous.
5. DataCenters will be monitored remotely.
6. Cost of compute can be decreased …
7. … by at least one order of magnitude.

Thank You – Join us at the Skanska Suite