

OSIsoft®

# USERS<sup>2011</sup> CONFERENCE



Turning **insight** into **action**.



# PI System for AMI

Presented by **Michelle Kuiee**, Product Manager, OSIsoft

# In the beginning...



# Early Adoption

- UFL Interface
- Custom Applications
  - ETL
  - Aggregation
  - Business Processes
  - Visualization

Untitled report

save

save as

Home

PROFILES

ANALYSIS

Forecast

Billing Report

Cos Phi

Chart

Data

Statistics

Monotonous

Load Duration

Dispersion

Exceedings

Impact

• Data

• Max power peak/off-peak

• Daily consumptions

• Average day

+ Add profiles to report

Selected Profiles:

☒ 541449010000000118 C-

☐ 541449010000000118 A+

☒ 541449010000000118 I

☐ Behind the stock house, cabin A34

<< Selected period: last week (from 28/05/2004 to 04/06/2004) Change... >>

Profile 1: 541449010000000118 C-

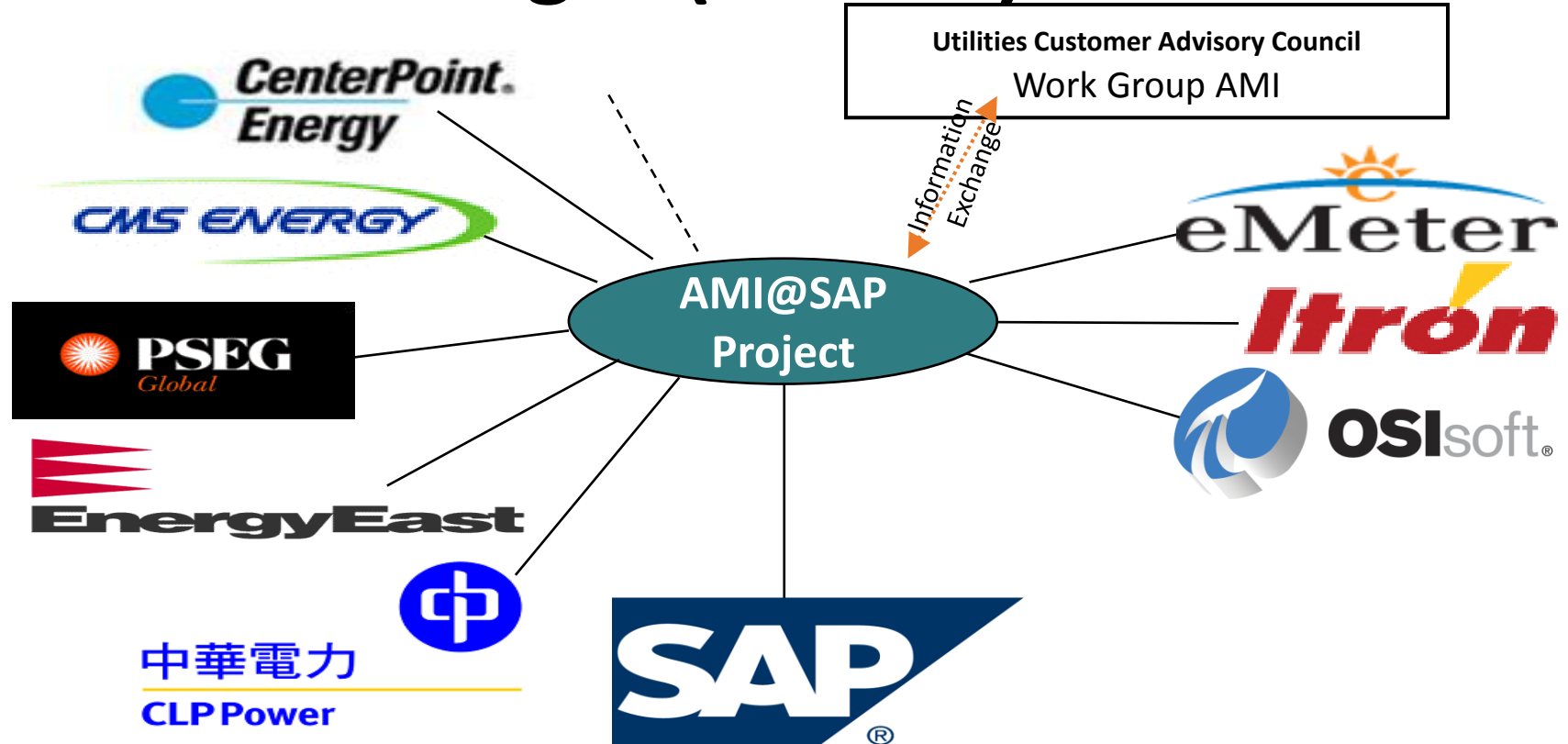
|                          | Measure  | Unit  | Time                         |
|--------------------------|----------|-------|------------------------------|
| Minimum Value Peak Hours | 0.00     | kvar  | 7/13/2005 7:45:00 AM         |
| Minimum Value Off-Peak   | 369.00   | kvar  | 7/13/2005 7:45:00 AM         |
| Maximum Value Peak Hours | 108.17   | kvar  | 7/13/2005 7:45:00 AM         |
| Maximum Value Off-Peak   | 15 576.5 | kvar  | 7/13/2005 7:45:00 AM         |
| Average Peak Hours       | 15 576.5 | kvar  | From 7/13/2005 to 12/05/2006 |
| Average Off-Hours        | 15 576.5 | kvar  | From 7/13/2005 to 12/05/2006 |
| Total:                   | 15 576.5 | kvarh | From 7/13/2005 to 12/05/2006 |

Profile 1: 541449010000000118 C-

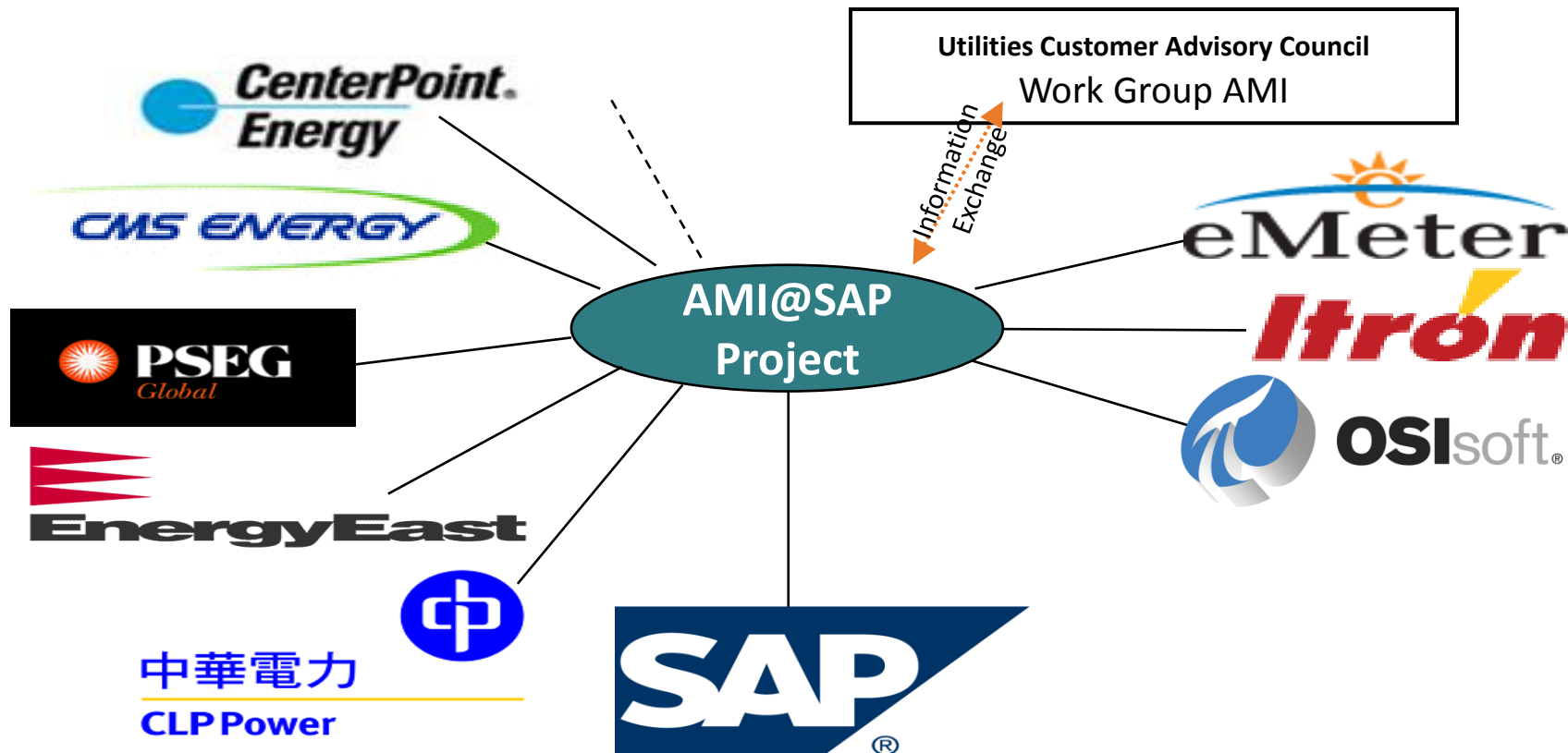
|                          | Measure  | Unit  | Time                         |
|--------------------------|----------|-------|------------------------------|
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| Average Off-Hours        | 15 576.5 | kvar  | From 7/13/2005 to 12/05/2006 |
| Total:                   | 15 576.5 | kvarh | From 7/13/2005 to 12/05/2006 |

Export Data

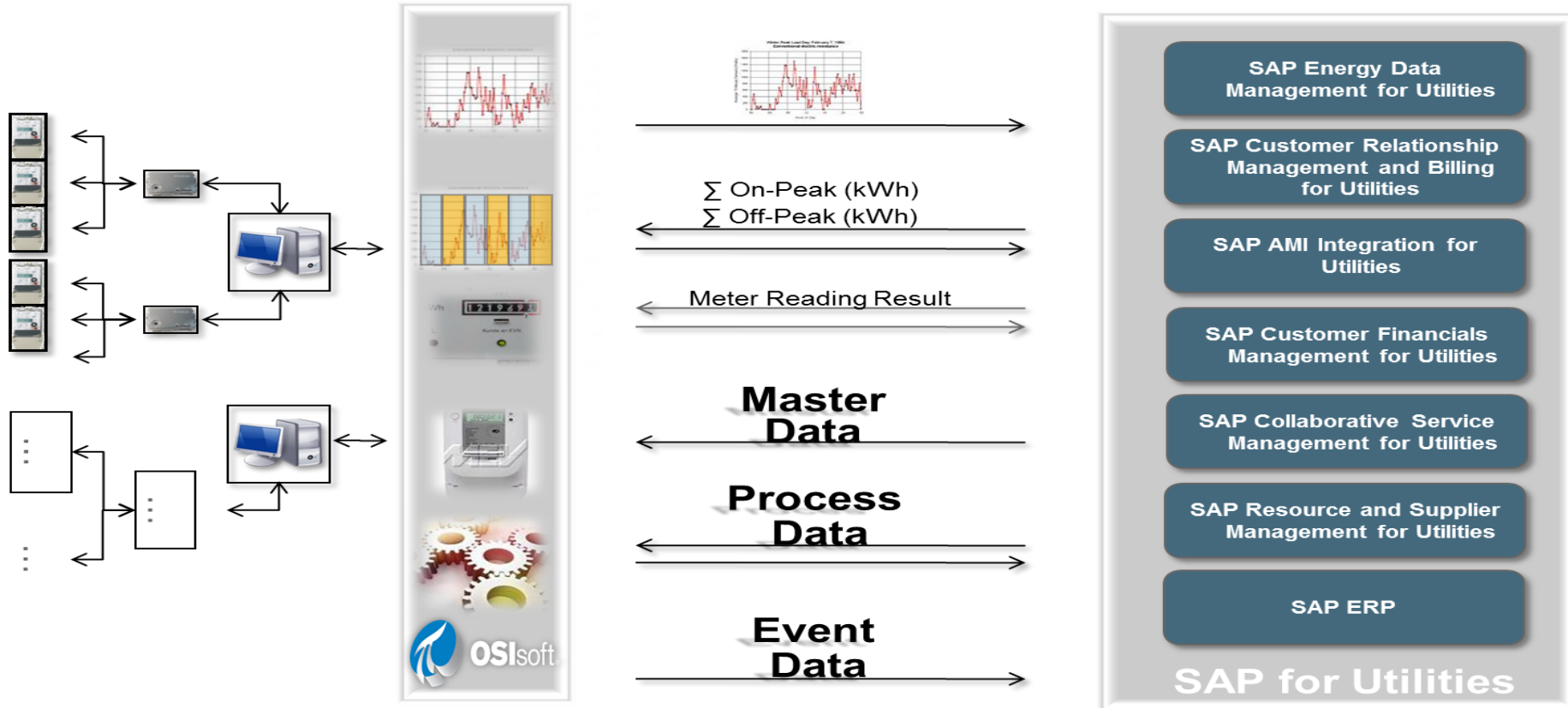
# Let there be light (houses)!



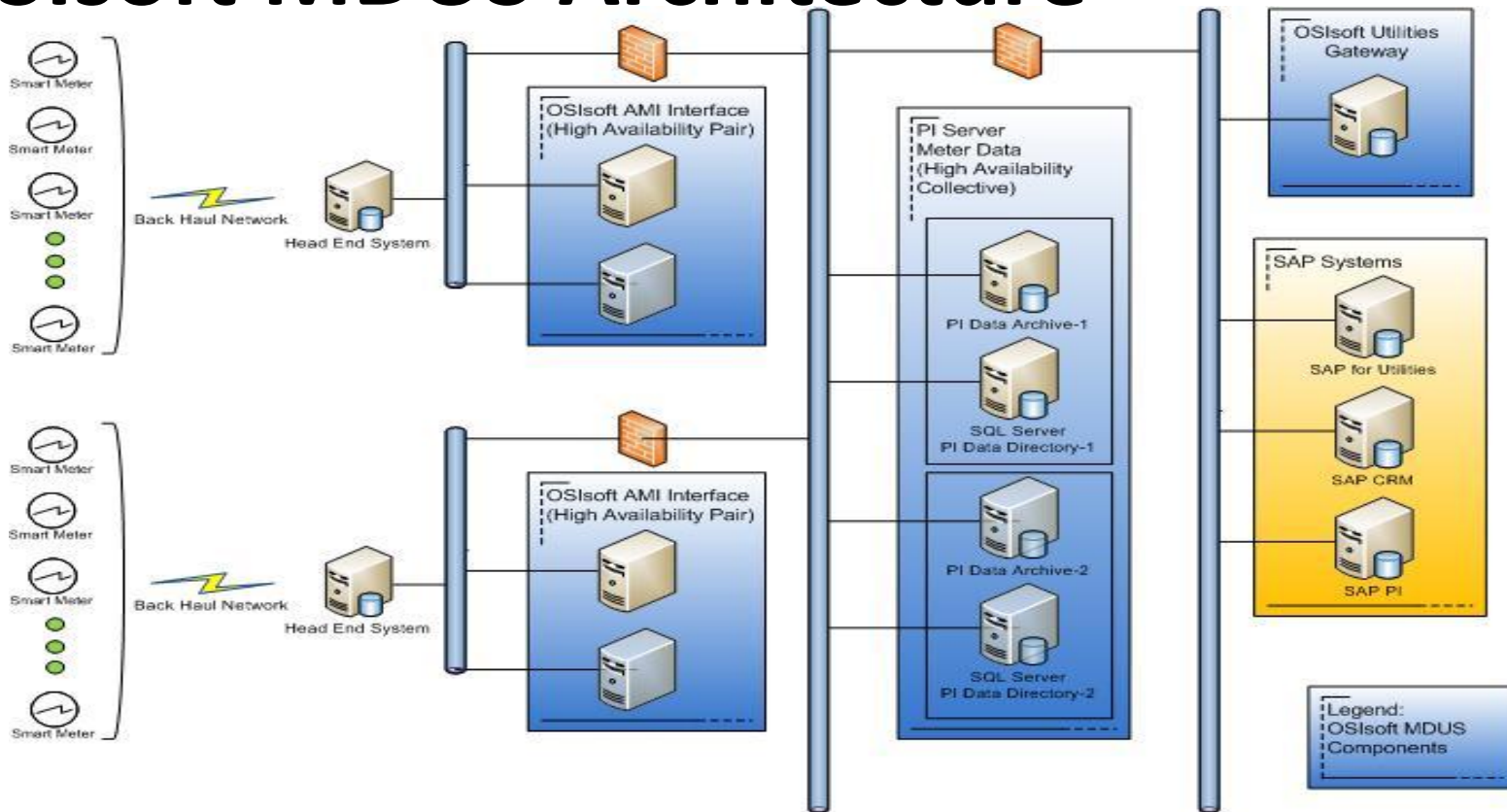
# SAP AMI Light Council (circa 2008)



# Meter Data Unification & Synchronization (MDUS)



# OSIsoft MDUS Architecture





# OSIsoft views on AMI

- Real-time challenge
- Keep everything
- Make data available to the experts

# PI AMI Interfaces

**INPUT**  
ELECTRICITY



Smart Meter

Registers

|                               |
|-------------------------------|
| Cumulative<br>Demand TOURateA |
| Max Demand kW<br>TOURateA     |
| Instantaneous Vrms            |
| Instantaneous Var             |
| Etc.                          |

Intervals/Channels over time

|                       |  |
|-----------------------|--|
| Interval kWh          |  |
| Interval kVarh        |  |
| Interval<br>Vrms(A-N) |  |

Meter State

Connected

Event

Tamper  
Event

# Question:

What data do you throw away?

**INPUT**  
ELECTRICITY



## Smart Meter

### Registers

|                    |              |
|--------------------|--------------|
| Cumulative Demand  | TOURateA     |
| Max Demand kW      | TOURateA     |
| Summation          | TOURateB kWh |
| Instantaneous Vrms |              |
| Instantaneous Var  |              |
| PF                 |              |
| Frequency          |              |

### Intervals/Channels over time

|                    |  |
|--------------------|--|
| Interval kWh       |  |
| Interval kVarh     |  |
| Interval Vrms(A-N) |  |

### Meter State

Connected

### Event

Power Restore

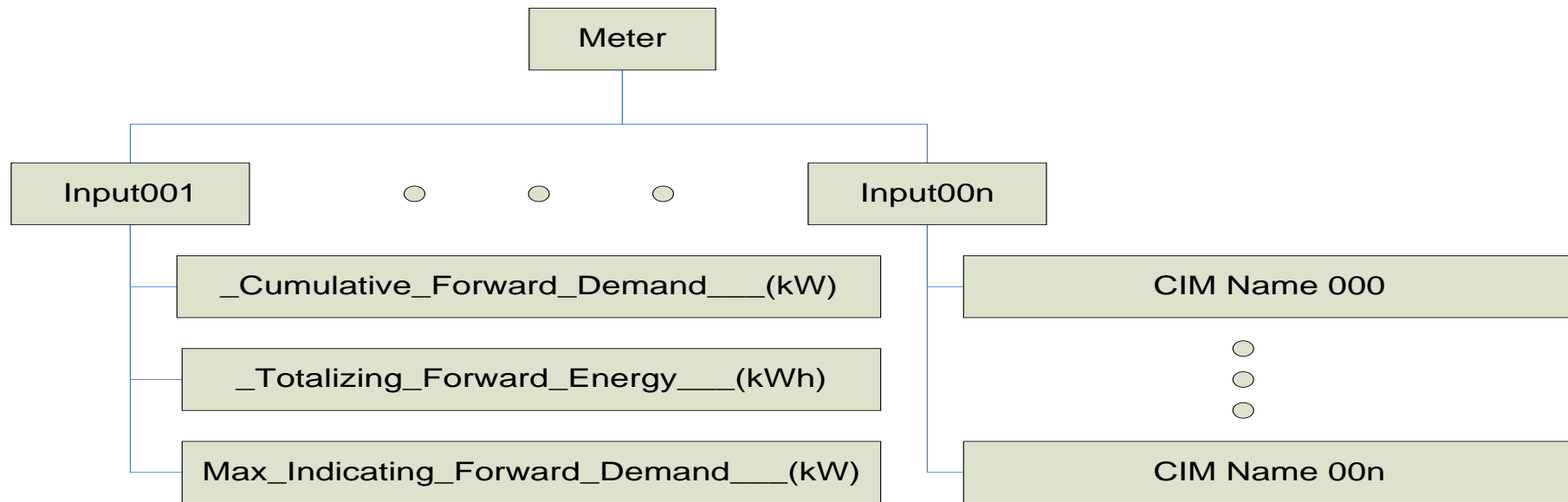
Billing says this is what we need

Engineering says this is what we need

Outage Management says this is what we need

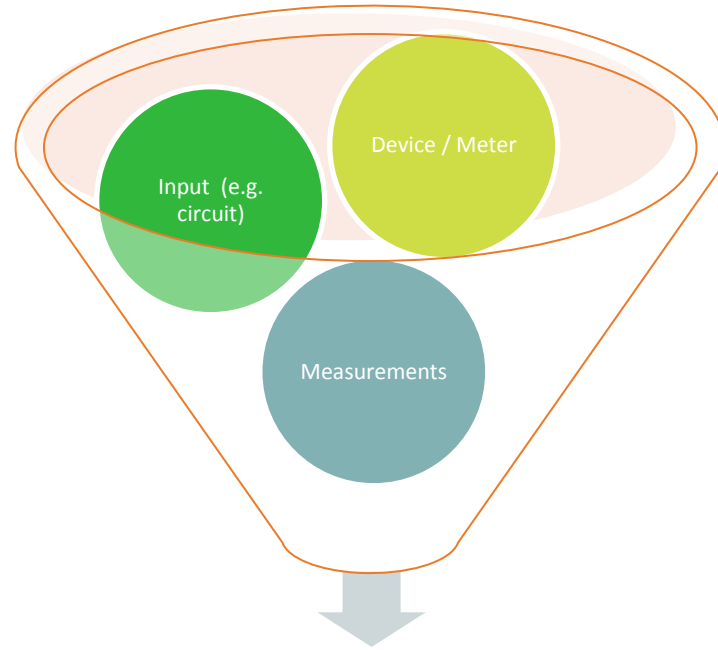
**Answer?**

# Asset Parent Child Relationship



# Design principle on AMI Interfaces

Bi-directional  
Command/Control  
Secure  
Asset based  
And above all...



**Self Configuring/Maintaining**

# And the end result is...

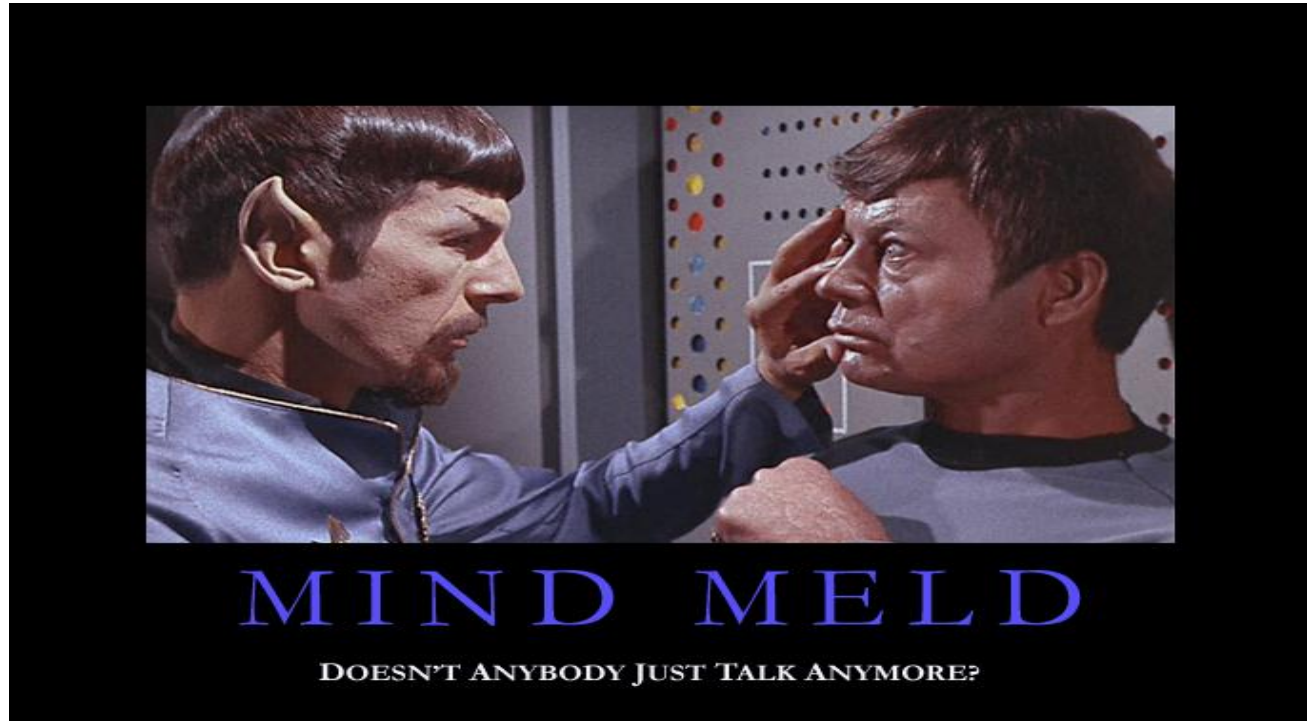
The screenshot displays the PI System Explorer interface. On the left, the 'Elements' tree shows a hierarchy starting with 'VendorX\_NP\_ab00dd100000', which contains an 'Input001' element. The main pane on the right shows the details for 'VendorX\_NP\_ab00dd100000' under the 'General' tab. The details are organized into a table with columns for 'Name' and 'Value'.

| Name                   | Value  |
|------------------------|--|
| CATALOG_NUMBER         | <simub>  |
| DEVICE_HW_PATCH_NO     | <simub>  |
| DEVICE_HW_REV_NO       | <simub>  |
| DEVICE_HW_VER_NO       | <simub>  |
| DEVICE_MFG             | <simub>  |
| DEVICE_MFG_MODEL       | <simub>  |
| DEVICE_NETWORK_STATUS  | Active   |
| DEVICE_STATUS          | Active   |
| DEVICE_SW_PATCH_NO     | <simub>  |
| DEVICE_SW_REV_NO       | <simub>  |
| DEVICE_SW_VER_NO       | <simub>  |
| DEVICE_UTIL_ID         | NP_ab00dd100000  |
| DeviceDescription      | <simub>  |
| DeviceName             | <simub>  |
| DeviceSerialNumber     | DSN_ab00dd100000   |
| DeviceType             | METER  |
| DID_SUB_TYPE           | I-210-RD   |
| Event                  | Cannot retrieve PI Point 'VendorX_NP_ab00dd100000.Event' for attribute 'VendorX_NP_ab00dd100000Event'. |
| HeadEndID              | SilverSpring   |
| Log                    | Cannot retrieve PI Point 'VendorX_NP_ab00dd100000.Log' for attribute 'VendorX_NP_ab00dd100000Log'.     |
| METER_MODE             | <simub>  |
| NIC_HW_PATCH_NO        | <simub>  |
| NIC_HW_REV_NO          | <simub>  |
| NIC_HW_VER_NO          | <simub>  |
| NIC_MAC_ADDRESS        | ab:00:dd:10:00:00  |
| NIC_MFG                | <simub>  |
| NIC_MODEL              | <simub>  |
| NIC_NETWORK_IDENTIFIER | <simub>  |
| NIC_RF_CHANNEL         | <simub>  |
| NIC_SERIAL_NO          | <simub>  |
| NIC_SW_PATCH_NO        | <simub>  |
| NIC_SW_REV_NO          | <simub>  |

At the bottom of the window, a status bar indicates: 'VendorX\_NP\_ab00dd100000 Modified: 4/21/2010 3:34:51 PM. Version: 1/1/1970 12:00:00 AM, Revision 1'.

# OSIsoft Interfaces (Next Generation)

They're like a



[http://echosphere.net/star\\_trek\\_insp/star\\_trek\\_insp.html](http://echosphere.net/star_trek_insp/star_trek_insp.html)



# Capability of PI AMI Interfaces in Production

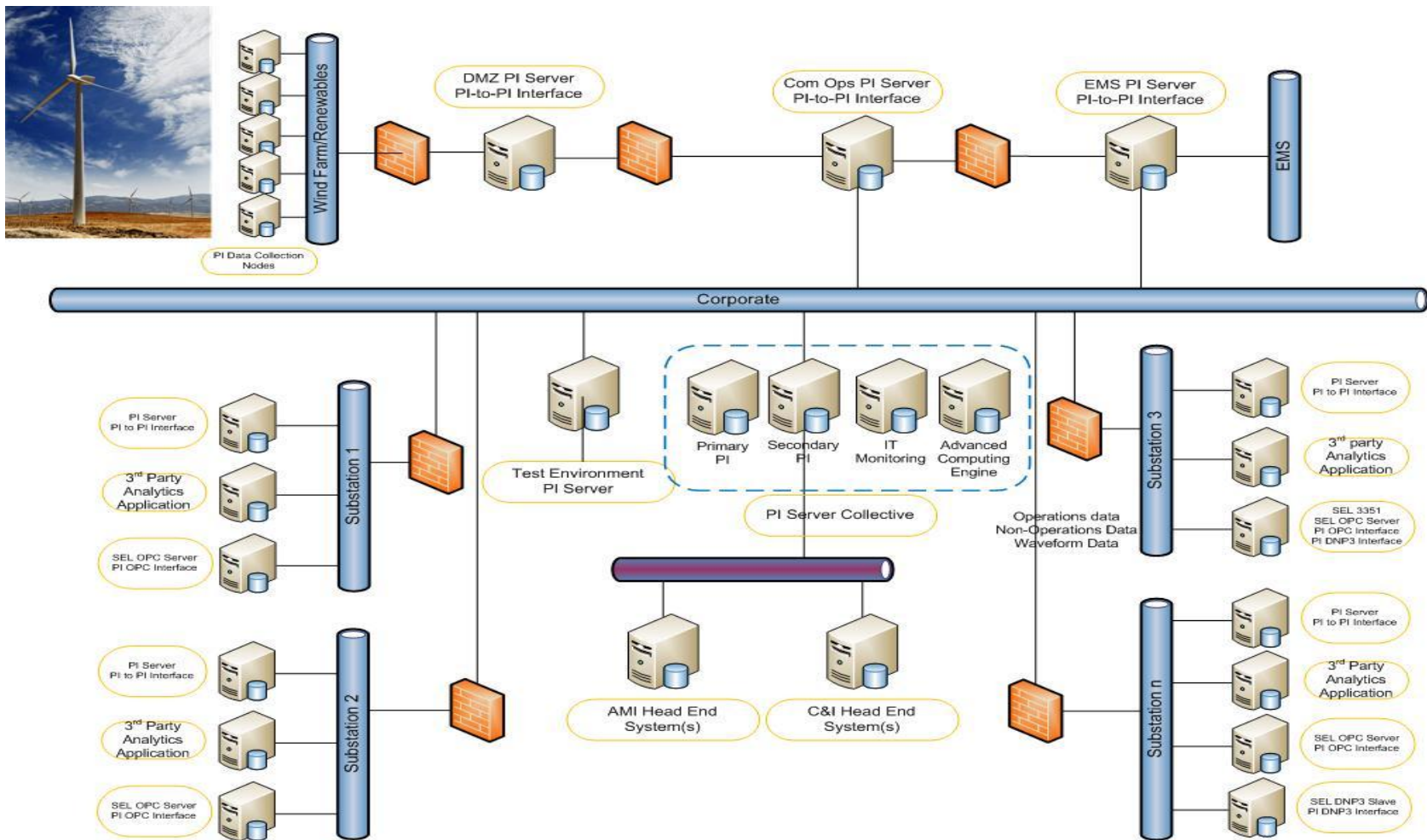
| Feature                   | Silver Spring | Grid Net | Trilliant | Elster | MultiSpeak | NEM (AEMO) | Echelon NES | L+G CC |
|---------------------------|---------------|----------|-----------|--------|------------|------------|-------------|--------|
| Synchronize Meter Asset   | ✓             | ✓        | ✓         | ✓      | ✓          | ✓          | (s)         | (s)    |
| Interval Reads            | ✓             | ✓        | ✓         | ✓      | ✓          | ✓          | (s)         | (s)    |
| Register Reads            | ✓             | ✓        | ✓         | ✓      | ✓          | ✓          | (s)         | (s)    |
| Event Data                | ✓             | ✓        | TBD       | ✓      | ✓          | ✓          | (s)         | (s)    |
| Remote Ping               | ✓             |          |           | ✓      | ✓          |            | TBD         | TBD    |
| Remote Connect/Disconnect | ✓             | ✓        | ✓         | ✓      | ✓          |            | (s)         | (s)    |
| On-Demand Read            | ✓             | ✓        | ✓         | ✓      | ✓          |            | (s)         | (s)    |
| Outage Notification       | ✓             | ✓        | (s)       | ✓      | ✓          |            | (s)         | (s)    |
| Meter Health              | ✓             | ✓        | TBD       | ✓      | ✓          |            | (s)         | (s)    |
| Demand Response           | TBD           | TBD      |           | TBD    | TBD        |            |             |        |
| HAN (Home Area Network)   | (s)           | TBD      | TBD       | (s)    | TBD        |            | TBD         | TBD    |
| Text Message              |               |          |           | (s)    |            |            |             |        |

# OSIsoft views on AMI (redux)

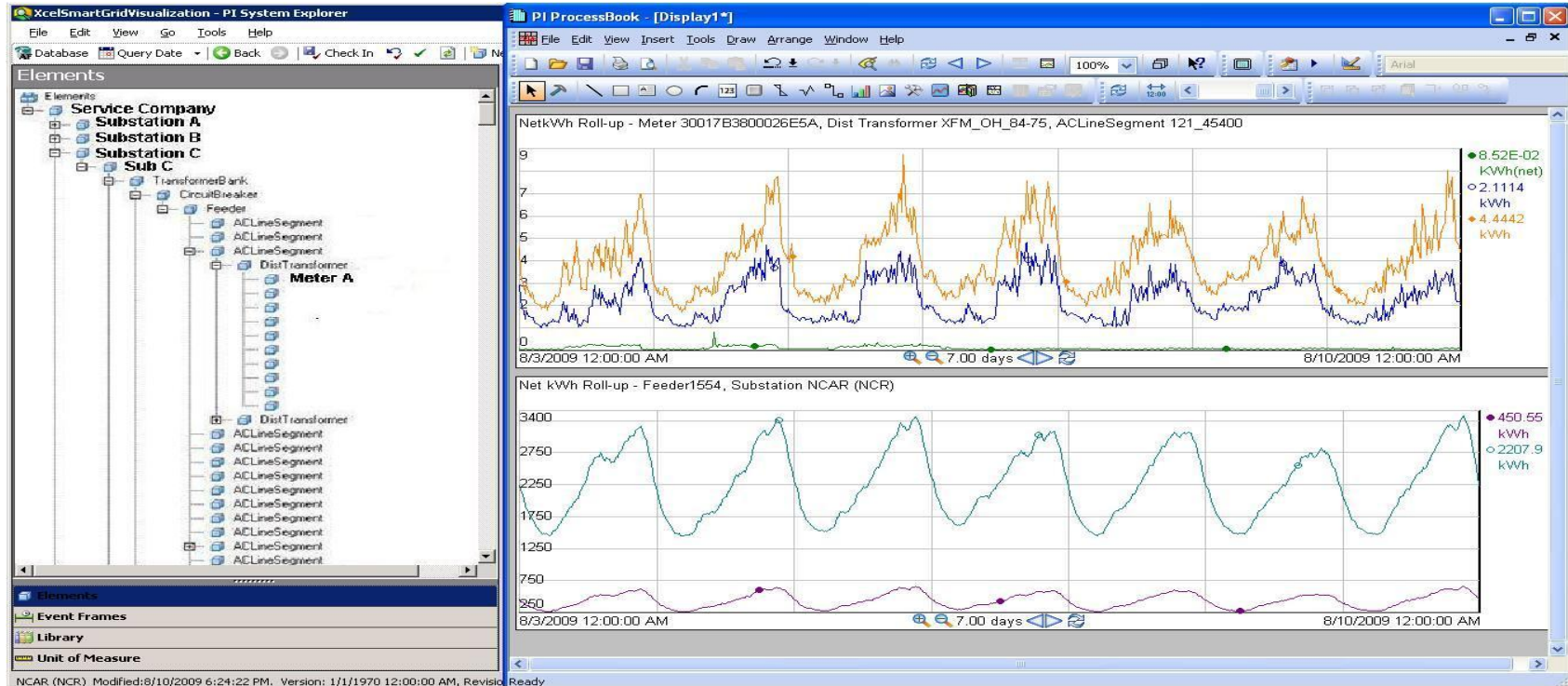
- Real-time challenge
- Keep everything
- Make data available to the experts

# Operational Data Management System (ODMS)

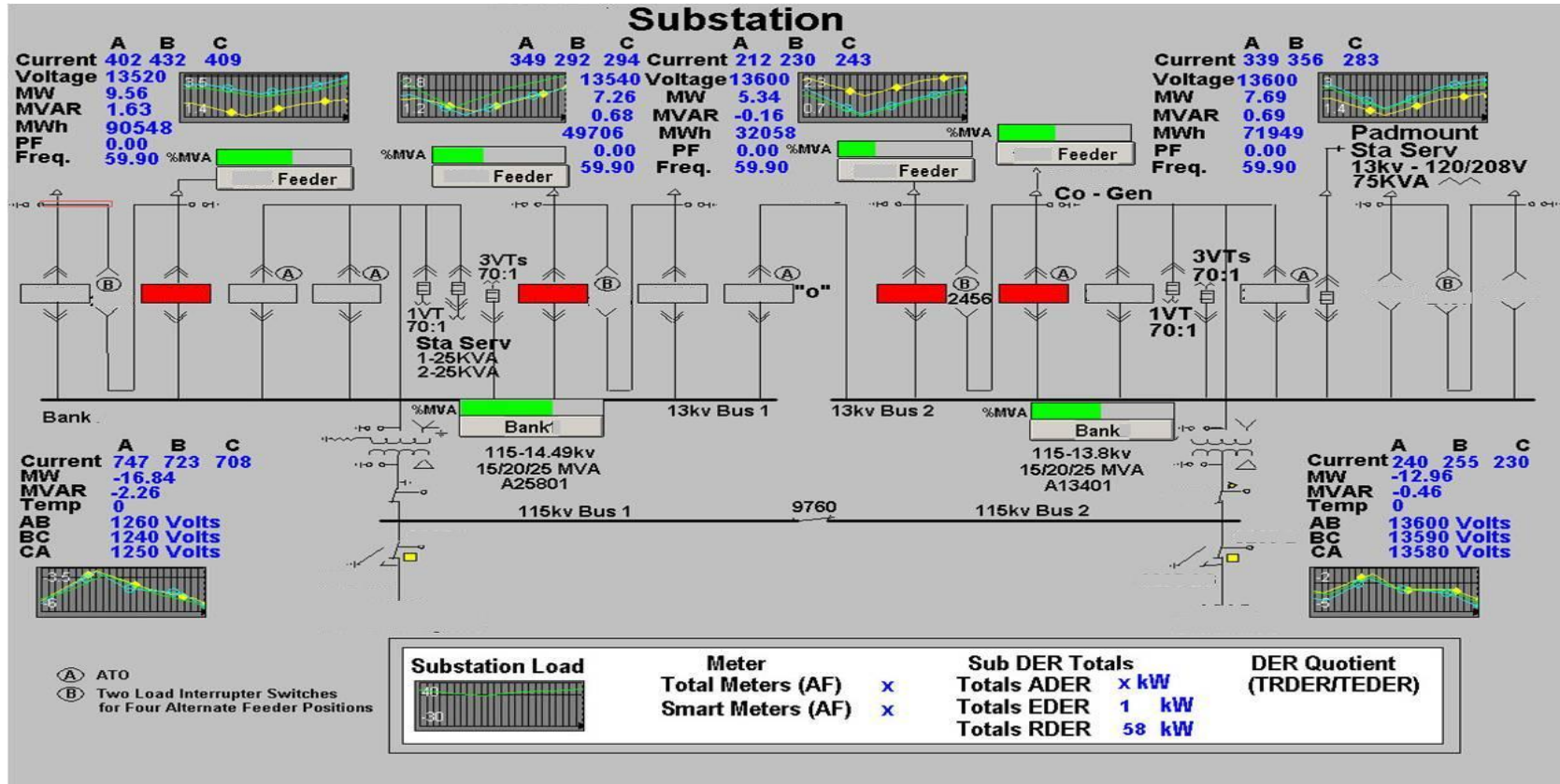
- Extremely large volumes of data
- Disparate data sources
- Multiple data frequencies and latency
- Timely reconciliation of
  - SCADA
  - Distribution Automation Systems
  - Metering



# Getting to Value: Understanding the “Roll-up” Mechanism: Net KWh Roll-Up

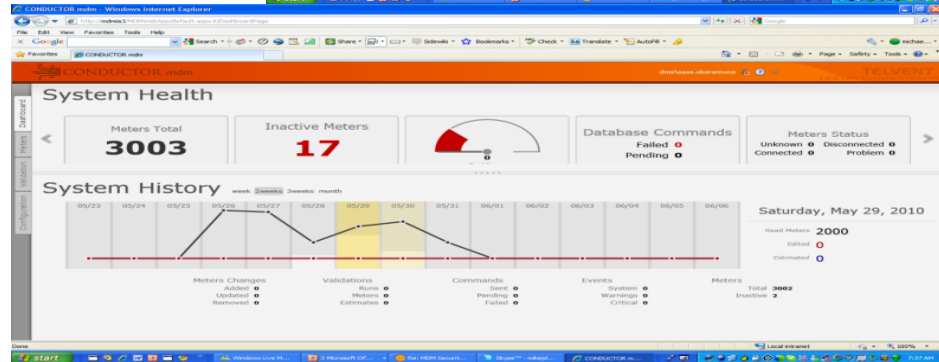
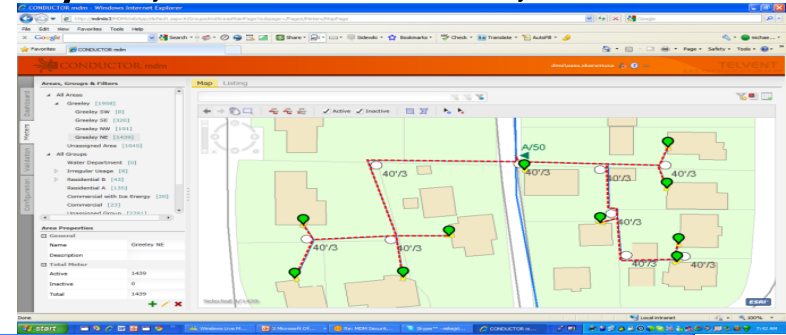


# Substation One Line: The "Roll Up" Report Card



# Conductor MDM Overview

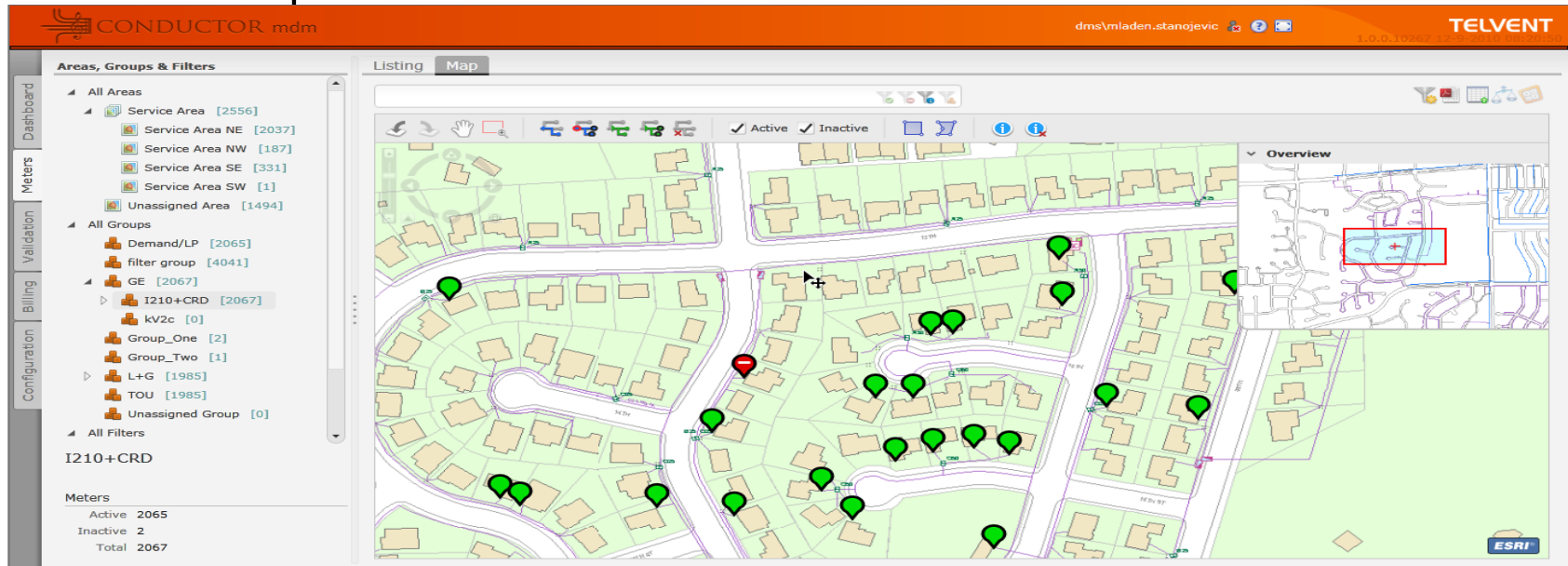
- Validation, estimation, query, analysis, visualization, and reporting
  - Integration:
  - GIS
  - CIS and CRM
  - DMS and OMS
  - SCADA
  - AMI
  - Analytics engine





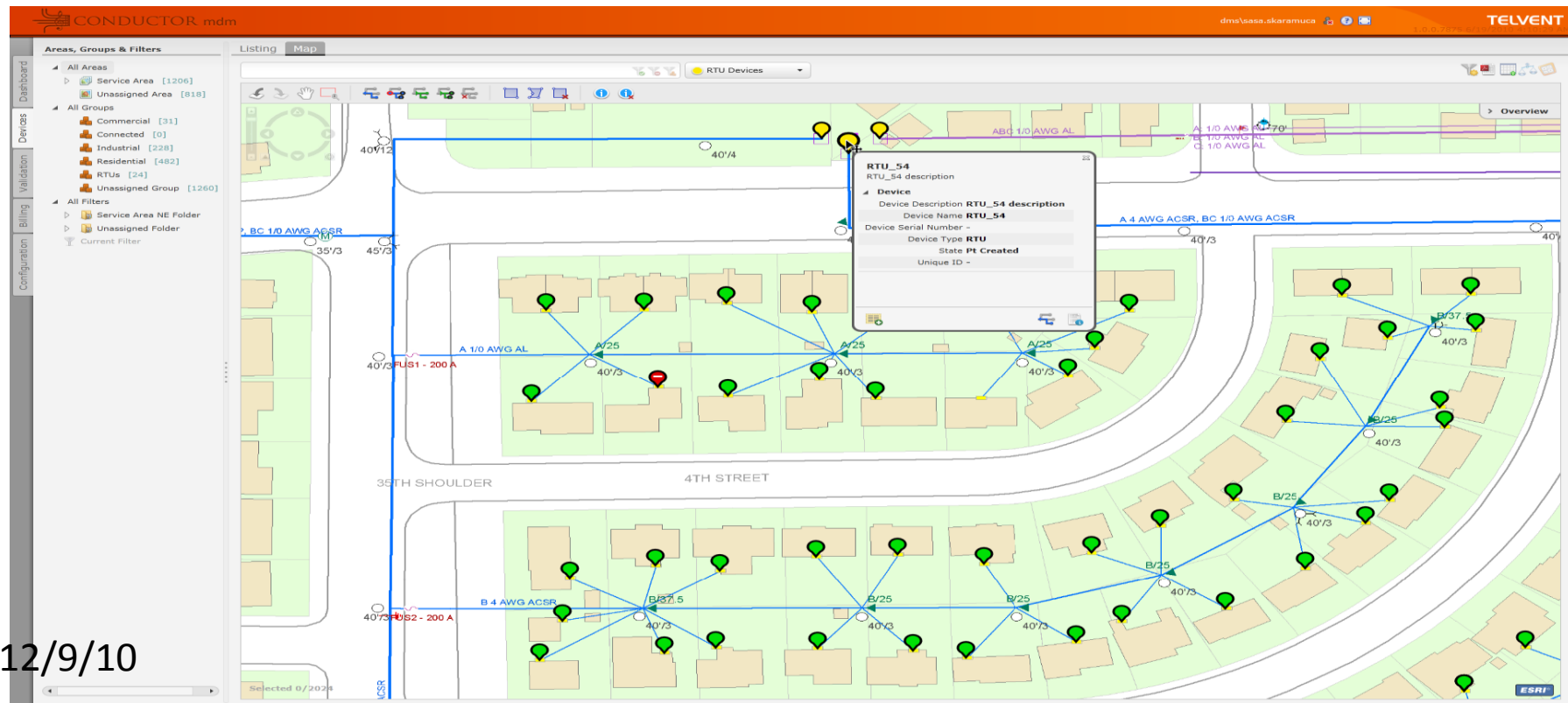
# Conductor MDM UI – Map View

- Integration with GIS. Provides info about location of a meter together with its electric connectivity. Way to analyze and compare consumption in a real-time is provided...





# Visualize and Manage RTU's + Meters



12/9/10

# Say again?

- Metering has gone beyond a single consumption value provided infrequently
- Very large, flexible MDUS systems installed with “automagic” capability
- AMI meter data used to extend value outside of billing and customer care
  - Traditional methods
  - New seamless/transparent methods becoming available

# More information

- OSIssoft Offering
  - Michelle Kuiee – [michelle@osisoft.com](mailto:michelle@osisoft.com)
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  - Kevin Walsh – [kwalsh@osisoft.com](mailto:kwalsh@osisoft.com)
- Telvent Offering
  - Marc Jones – [marc.jones@telvent.com](mailto:marc.jones@telvent.com)
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# Thank you

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into **action.**