

OSIsoft.

### REGIONAL 8 SEMINAR 5

A P A C

The Power of Data



# Information Directed Management

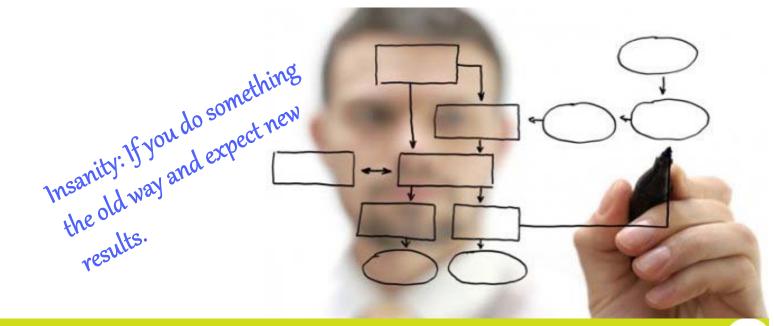
Presented by Glen Garner, Senior Management Consultant IBM



#### Analytics, leverage information in new and compelling ways

#### Agenda:

- 1. The Environment driving our Energy industry
- 2. Analytics A platform for supporting change
- 3. Decision support systems span operational and information technologies



#### **Grid emerging issues**

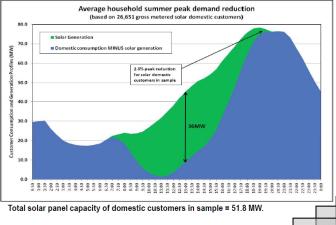
#### **Peak Power**

- Peak Power driving our grid costs
- > Are Electric Vehicles the new air conditioners?
- Solar doesn't help

#### Renewables:

- Voltage rise from solar PV
- Variability of grid impact





7.000

6.000

5,000

4,000

3,000

2,000

1,000

Wholesale market drivers have low coincidence with network constraints (<18% in one recent study)

Energex, Summer

uncontrolled EV load

controlled EV load

Peak Day

Predicted: With

added

Predicted: With

#### **Grid Visibility**

- Reducing grid losses (improve power factor, voltage reduction and phase balance)
- All of these issues require greater visibility of the MV and LV networks to inform when and where corrections should be applied



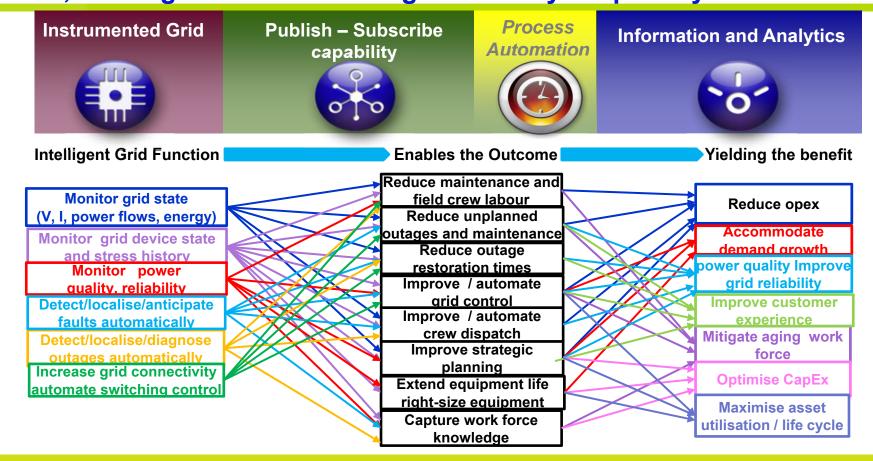


### **Smart Grid Analytics An evolution....**



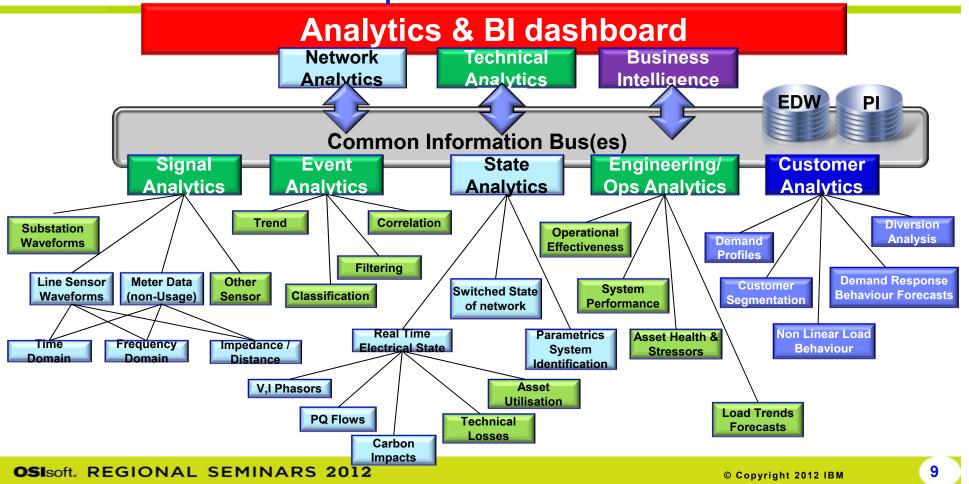
### Smart Grid capabilities are analytics driven, that can evolve over time; starting small and building in maturity / capability:





Analytics; requires an open architecture and CIM + relational and time series capabilities:









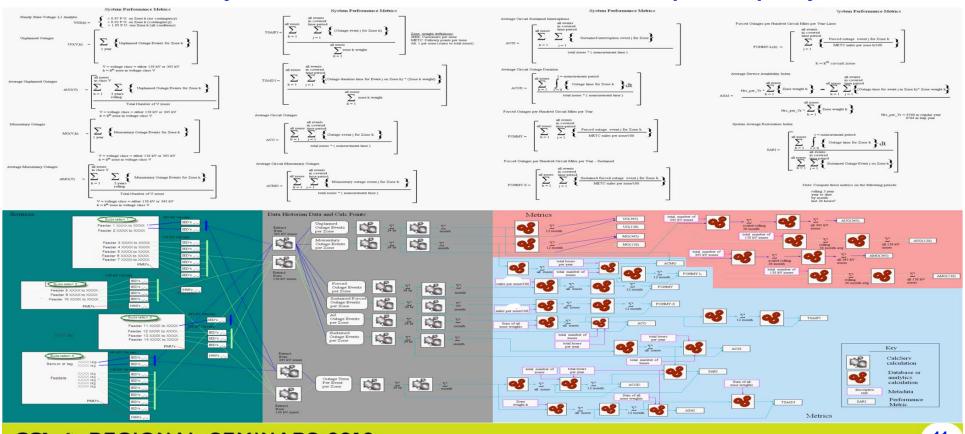
### Distribution example 1 Operational, Performance measurement focus





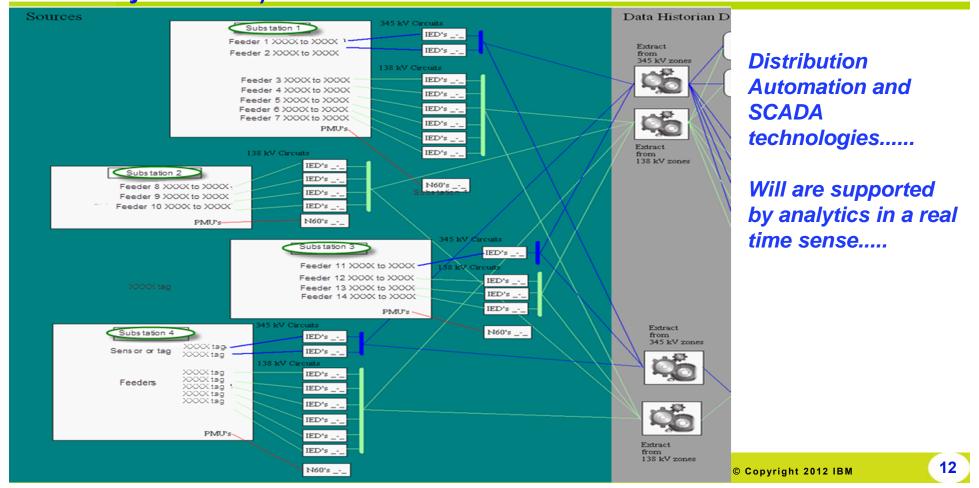
#### We are starting to move past guessing:

#### End to end analytics will drive us into the economic sweat spot that policy demands



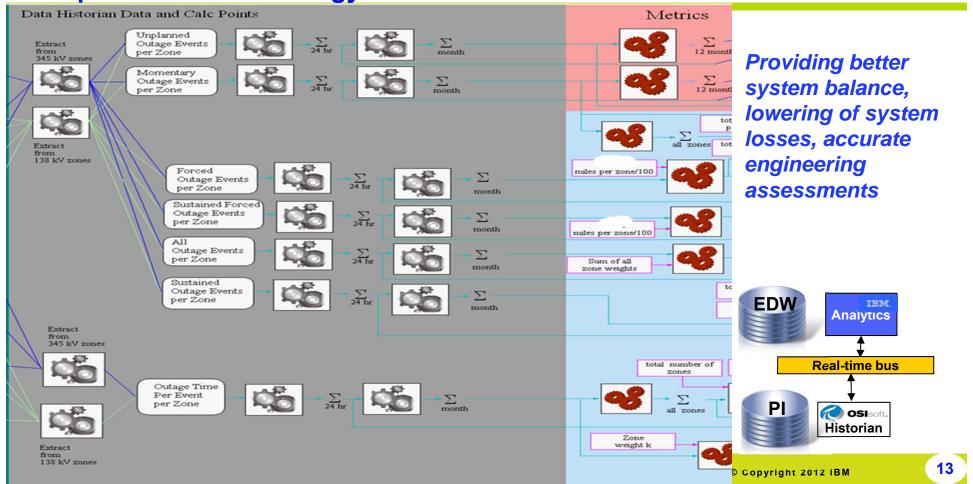
From Distribution Automation (supporting DSM, reliability and loss):





### To analytics that support improved decision support at an Operational Technology level:

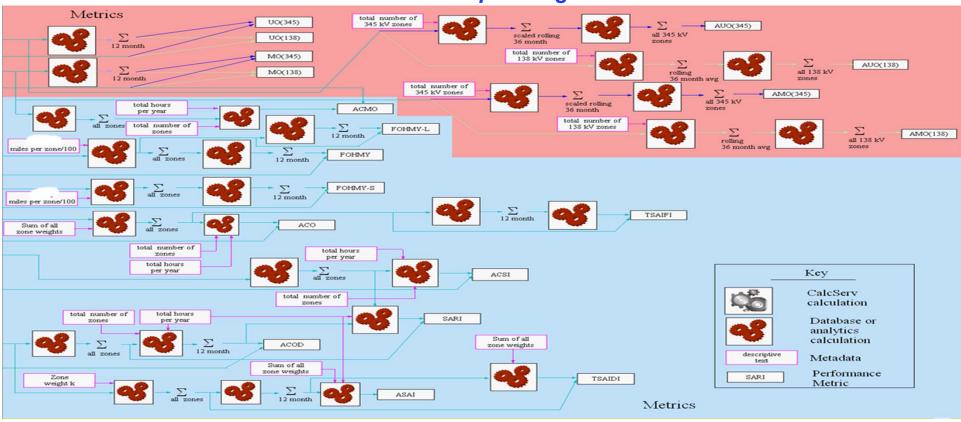




### To OT / Finance based analytics that support strategic operational directions:

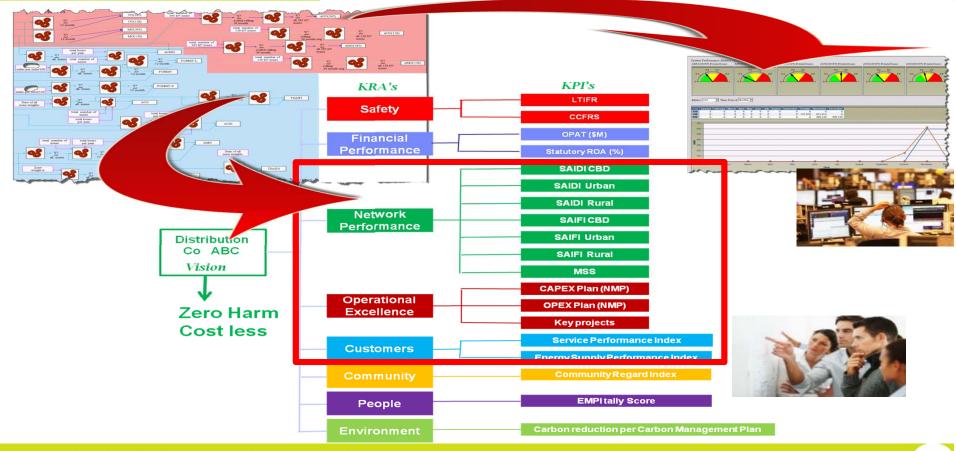


Then translating that into economic models that provide near real-time Key Performance Data and advanced Scenario planning:



### Data, transformed into information and knowledge provide better decision support for operational and business objectives







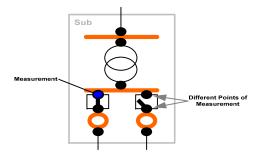


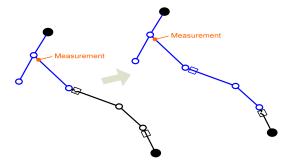
### Distribution example 2 Optimisation, loss minimisation focus

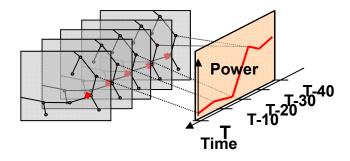


### This suite of analytics provides a Power Grid Model which is CIM based and brings static and dynamic aspects of grid together









Captures the precise point where measurements are taken.

Based on the CIM's Terminal-Measurement relationship. Allowing information retrieval

based on on the Switch's state.

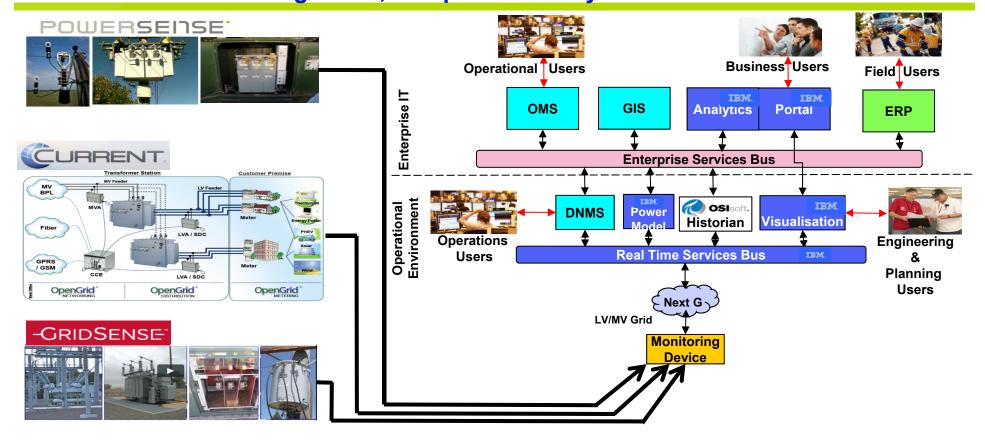
Provides grid connectivity context, taking consideration of both the static topology and the dynamic state of switches.

In figure above, the same measurement point feeds one or three substations, depending on the grid switching.

- This provides a historic context to time-series data streams for any periods of time. Grid state changes can e.g. explain suspicious changes in load at a point in time in the past.
- Support for fault- and other investigations, providing the grid connectivity for a past point in time.

### With a core of technical analytics built on an OSI PI platform, IBM built the solution to be sensor agnostic; and provide many business value streams:

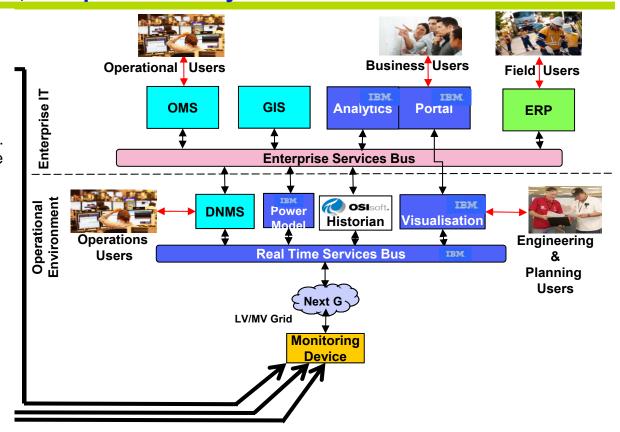




### With a core of technical analytics built on an OSI PI platform, IBM built the solution to be sensor agnostic; and provide many business value streams:



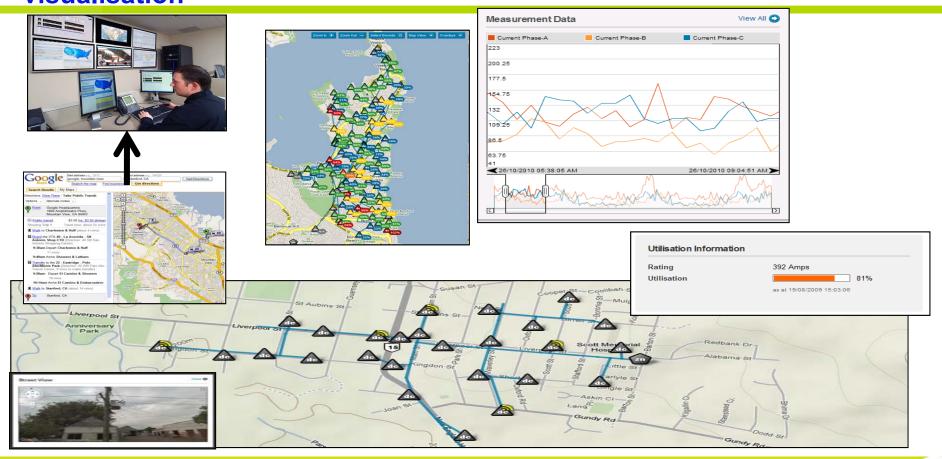
- Improved time to diagnose and rectify outages.
  - Proactive reporting of faults instead of waiting for customer to report fault
  - Remote diagnosis of fault location on 11kV feeder
  - Remote setting of Earth Fault Indicators.
  - Load Surveys can be avoided due to the presence of accurate measurement data.
- Improved network planning and management of capital expenditure
  - More data is available to support planning and forecasting.
  - Network Augmentation Deferrals
  - Power Factor and Phase balance correction
- ✓ Outage Data management
- ✓ Reduce battery monitoring costs
- √ Faster decision on new connections (customer > 100 amps)
- ✓ Customer voltage investigations
- ✓ Inbound outage calls management
- ✓ Enables LV Parallel Processes



© Copyright 2012 IBM 19

### **Analytics - high functionality via effective integration and visualisation**





### When metering data is combined with last transformer data, LV Phase Connectivity can be determined



Alternative approaches to determining LV connectivity (GPS coincident measurement system, correlation of AMI data with known network analog data)

Measurement of the:

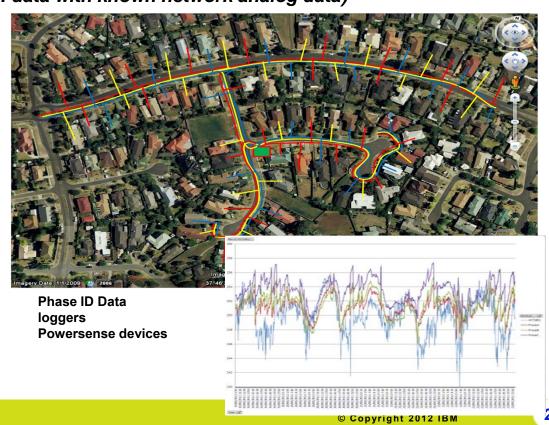
- ✓ kWh, or
- ✓ Instantaneous Current, or
- ✓ Instantaneous Power.

Periodic measurements taken at:

- ✓ Smart Meter at customer.
- ✓ Smart Sensor at Transformer.

Meter and Substation data are processed to accurately identify phase connections of each meter

Phase balance benefits projected at \$millions per annum







### **Generation example 3 Managing mixed energy sources**



Unit Commitment in a generation portfolio: Which units, which time, what levels?

#### **Each Thermal Generator has**

- -An initial production level
- -Minimum maximum generation level
- -Minimum up and down times
- -Maximum ramp up and down rate
- -A startup fuel consumption coefficient
- -A linear fuel consumption formula

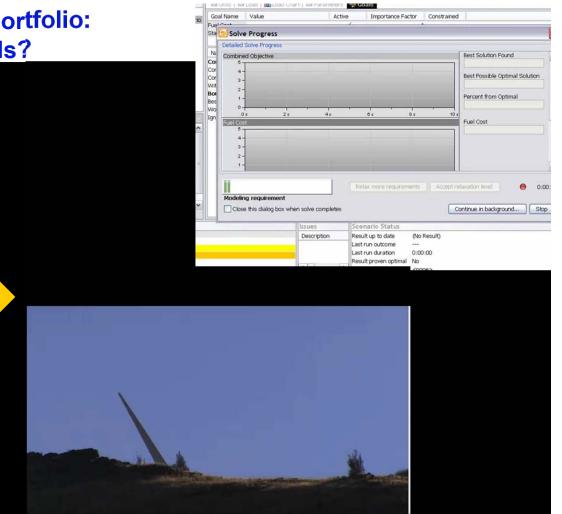
**Bureau of Meteorology** 

**Historical Data** 

#### **Each Renewable source has**

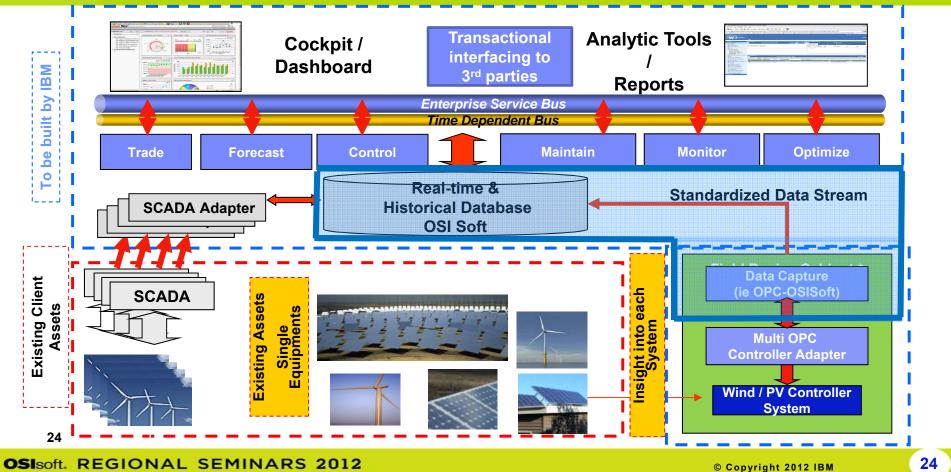
- -An initial production level
- -Minimum maximum generation level
- -Response time
- -Predictable time of capacity at capacity %
- -Predictable variability

OSIsoft. REGIONAL SEMINARS 2012





#### **Virtual Power Production Solution**





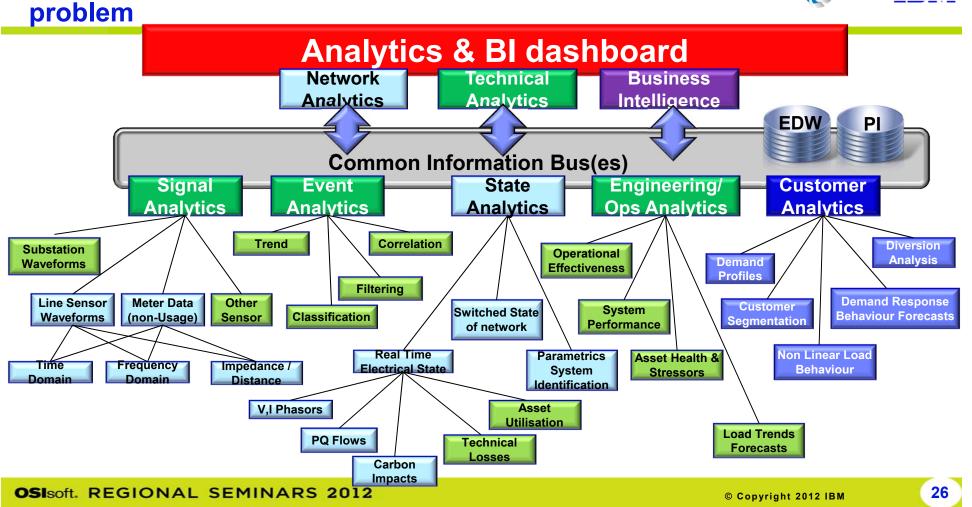


### **Generation example 4 Condition Monitoring**



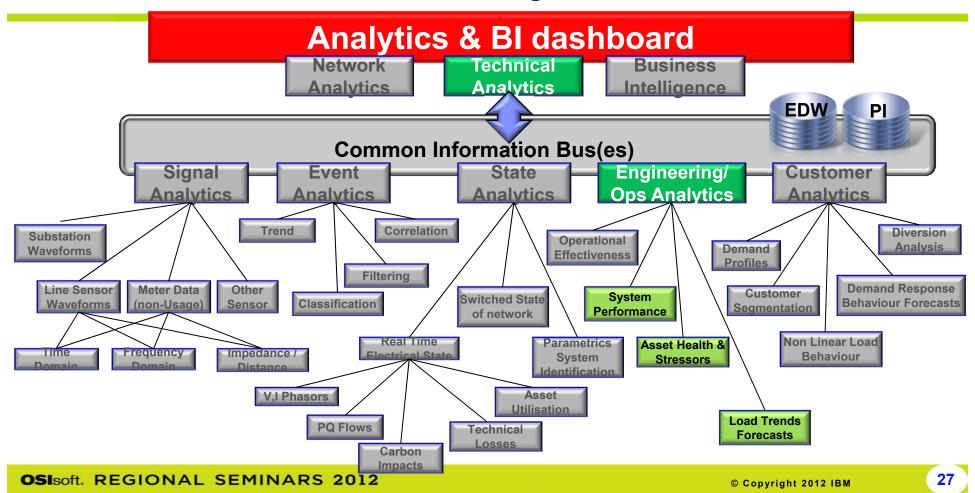
Various analytics can be addressed – depending on the





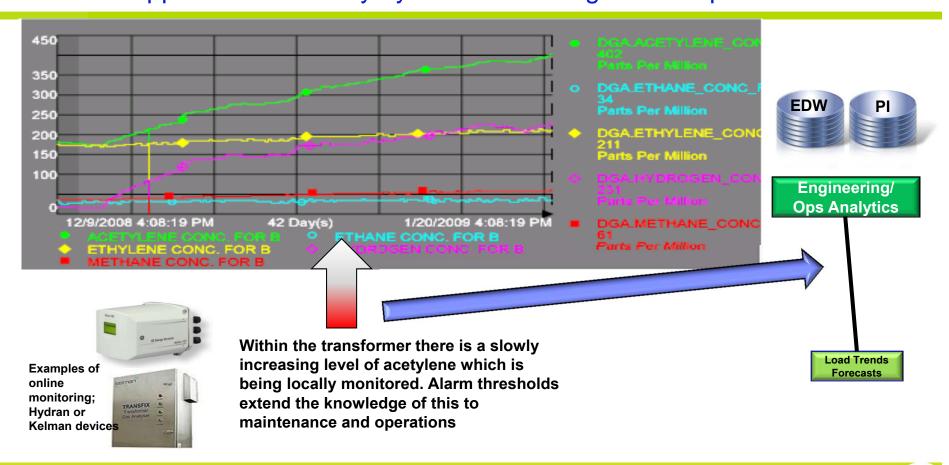
#### In this case Condition Based Monitoring





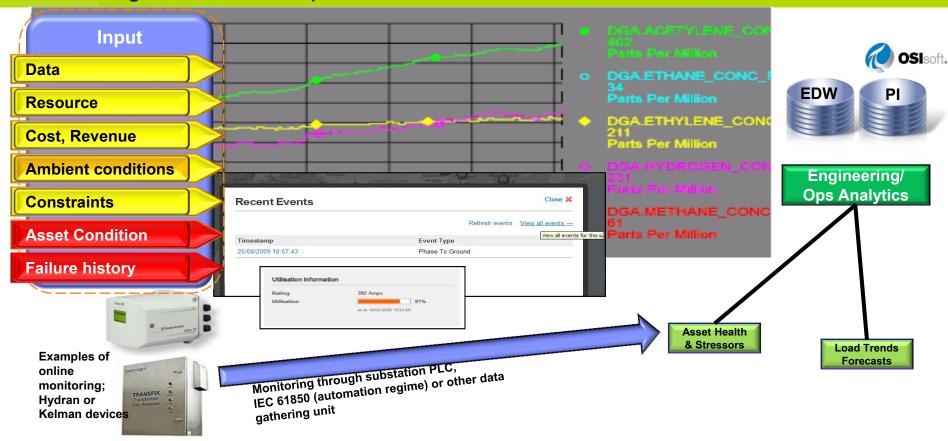


#### Decision support is done today by manual readings and "experience"



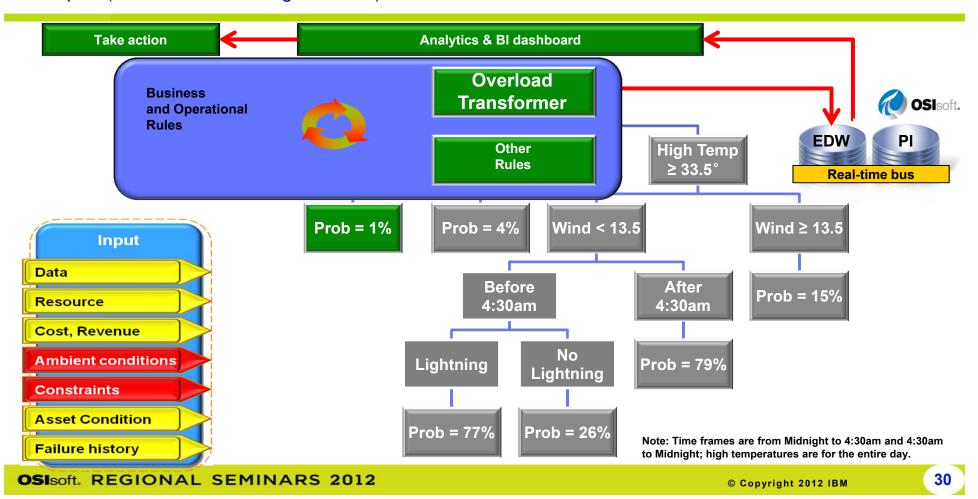


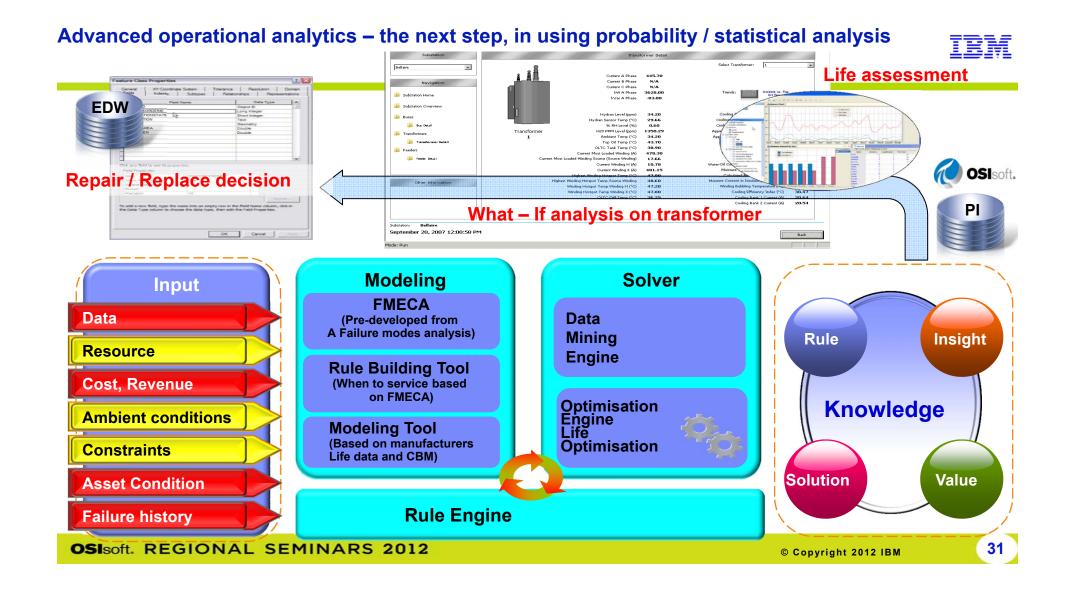




Knowing ambient conditions and load constraint factors allows categorization of priority to repair (in this case avoiding overtime):







#### **Summary**



By creating standard architectures bridge the IT and OT world

By using multi-message bus approaches (real-time and enterprise)

By combining data from time-series and relational databases

By complying with standards based data formats (CIM)

We have a rich, high value environment that is enhancing planning, operational and business capabilities – taking decision support capabilities to new levels. Allowing information to take a new position in energy production and distribution.



## THANK



OSIsoft. REGIONAL SEMINARS 2012

© Copyright 2012 OSIsoft, LLC.