SISCO

The Standards Based Integration Company

Systems Integration Specialists Company, Inc.

CIM Base PMU Registry

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SISCO, Inc.
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Topics

- SISCO

- NASPInet

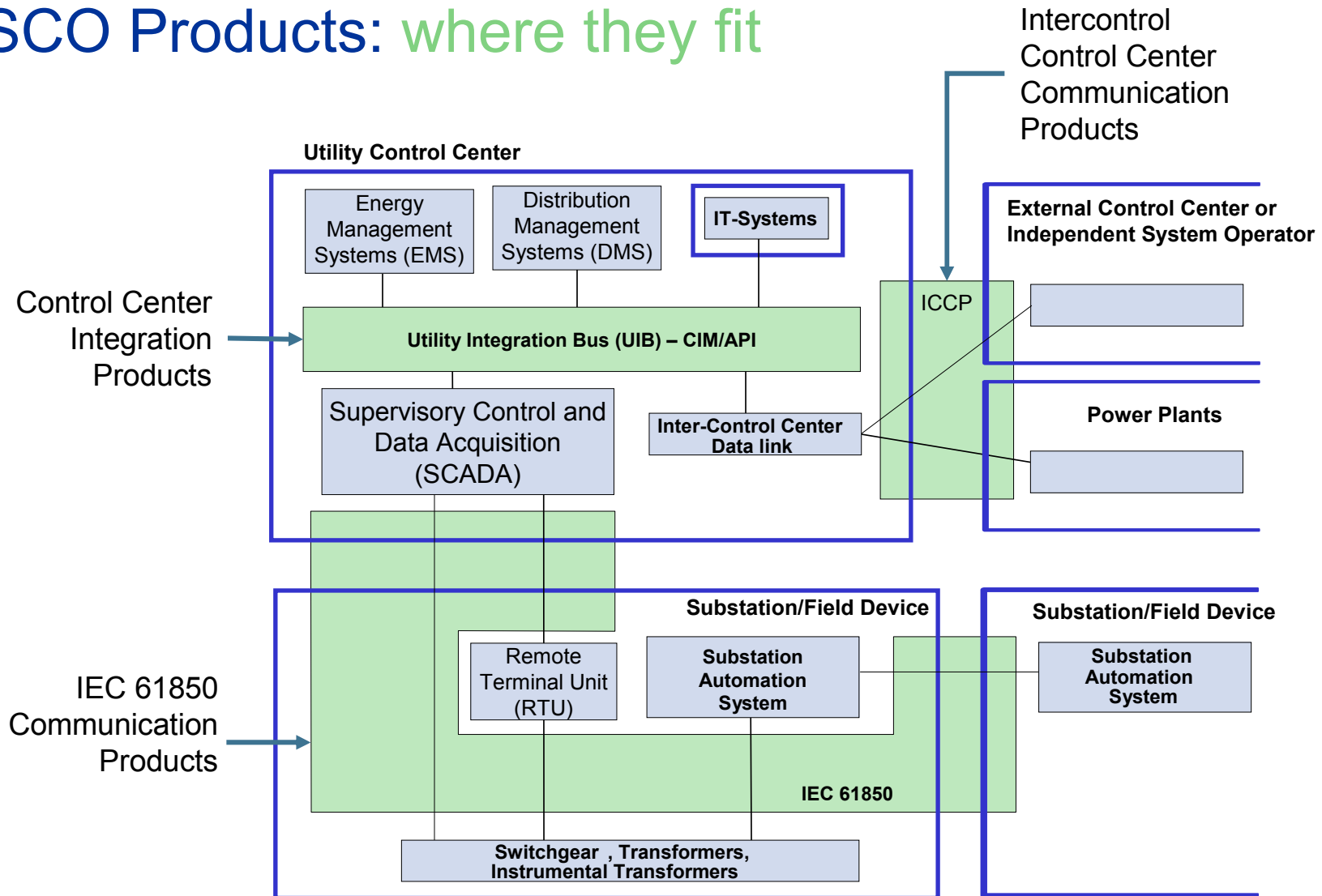- IEC Common Information Model

- Registry Use

SISCO Active in Standards

- ISO
  - TC184 - ISO 9506 (MMS)

- EPRI
  - UCA 2.0 (IEEE TR1550)
  - Control Center API (Common Information Model – CIM)

- IEC Technical Committee 57 (TC57)
  - WG07 – IEC60870-6 TASE.2 (ICCP)
  - WG10 – IEC61850
  - WG13 – IEC61970 (CIM and API)
  - WG14 – IEC61968 (CIM)
  - WG15 – Communications Security
  - WG16 – Energy Market Extensions to CIM
  - WG17 – Distributed Resources
  - WG19 – TC57 Harmonization

- OPC Foundation
  - Unified Architecture

SISCO Products: where they fit

Intercontrol Control Center Communication Products

Control Center Integration Products

IEC 61850 Communication Products

Utility Control Center

Energy Management Systems (EMS)

Distribution Management Systems (DMS)

IT-Systems

Utility Integration Bus (UIB) – CIM/API

Supervisory Control and Data Acquisition (SCADA)

Inter-Control Center Data link

ICCP

External Control Center or Independent System Operator

Power Plants

Remote Terminal Unit (RTU)

Substation Automation System

Substation/Field Device

Substation Automation System

Substation/Field Device

IEC 61850

Switchgear , Transformers, Instrumental Transformers

SISCO Products - Communications

- IEC61850 Substation Automation
    - Protocol source code for OEMs: MMS-EASE Lite
    - AX-S4 MMS ("Access for MMS") OPC interface for plug-in access to IEC61850 for Windows applications.
    - Unified Analytic Platform for real-time analytics using IEC GOOSE

- ICCP-TASE.2 for Intercontrol center communications and power plant dispatching:
    - ICCP Development Tools: for OEMs to embed ICCP into their applications and devices
        - ICCP-TASE.2 Extensions for MMS-EASE Lite (Source Code)
        - ICCP Toolkit for MMS-EASE (Binary Object Library)
    - AX-S4 ICCP ("Access For ICCP") OPC interface for plug-in access to ICCP for Windows applications

SISCO Products - Integration

- Utility Integration Bus (UIB)
  - Electric utility specific standards based extensions for off-the-shelf commercial middleware
    - Provides IEC T57 and IntelliGrid standard support enabling extension of EAI, BPI, BPM, and Enterprise Information Integration (EII) into the operations functions of utilities.
    - IBM WebSphere
    - Other JMS based middleware can be supported
  - Products
    - Development tools enabling standards based application adapter development
    - Deployment tools for off-the-shelf integration:
      - Adapters

SISCO Products for the OSIsoft PI System

- AX-S4 ICCP
  - Preferred OSIsoft interface for ICCP-TASE.2

- AX-S4 MMS
  - Preferred OSIsoft Interface for IEC 61850

- COMTRADE Utility
  - Retrieves IEEE COMTRADE format disturbance and oscillography files from substation devices and stores them into the PI archive

- UIB Adapter for PI
  - Empowers the PI environment with support for the Common Information Model (CIM), the standard API/Services, and SOA middleware.

- Unified Analytic Platform for PI
  - Real-time analytic platform for wide are remedial action using IEC 61850 GOOSE, PMU data, and other real-time streams on the OSIsoft PI System.
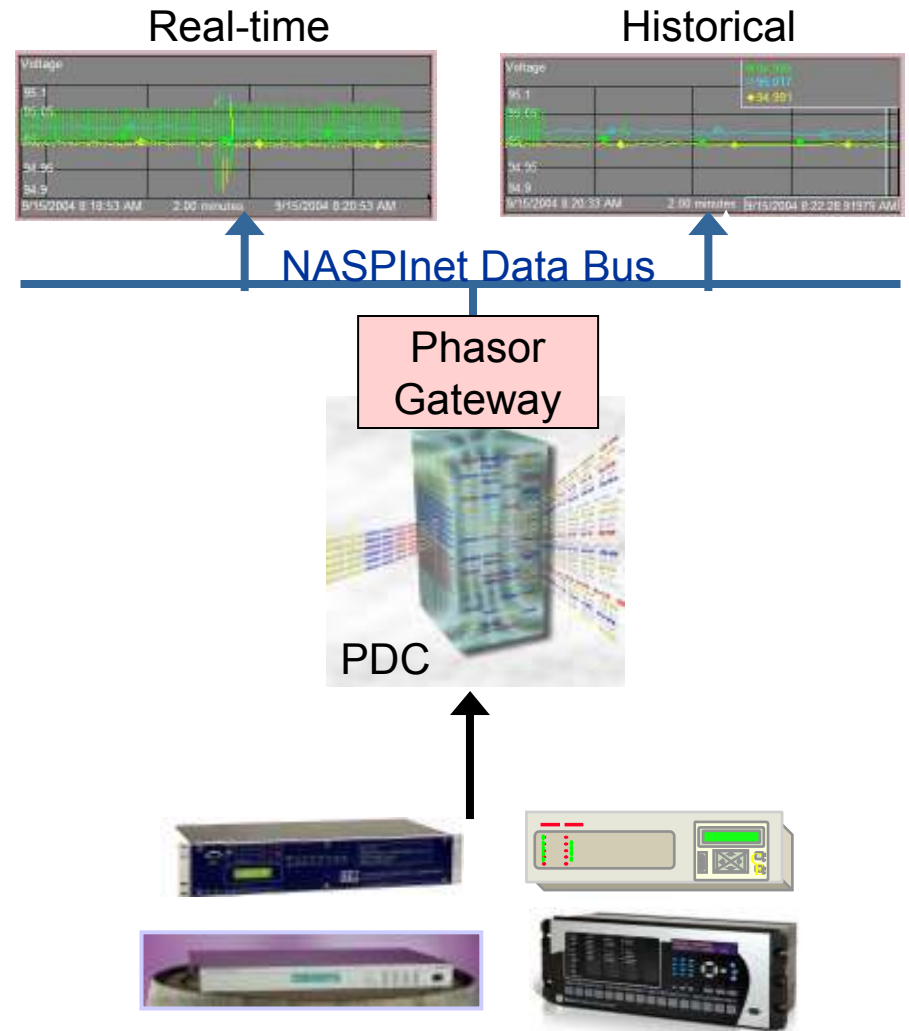
Some SISCO Customers

End Users

- San Diego Gas & Electric
- Southern California Edison
- Sacramento Municipal Utility District
- US Army Corps of Engineers
- TXU Energy Delivery
- DTE Energy
- Long Island Power Authority
- Xcel Energy
- American Electric Power
- Tennessee Valley Authority
- Centerpoint Energy
- EDF
- Shanghai Municipal Power Authority
- Korean Electric Power Company
- ETSA Utilities
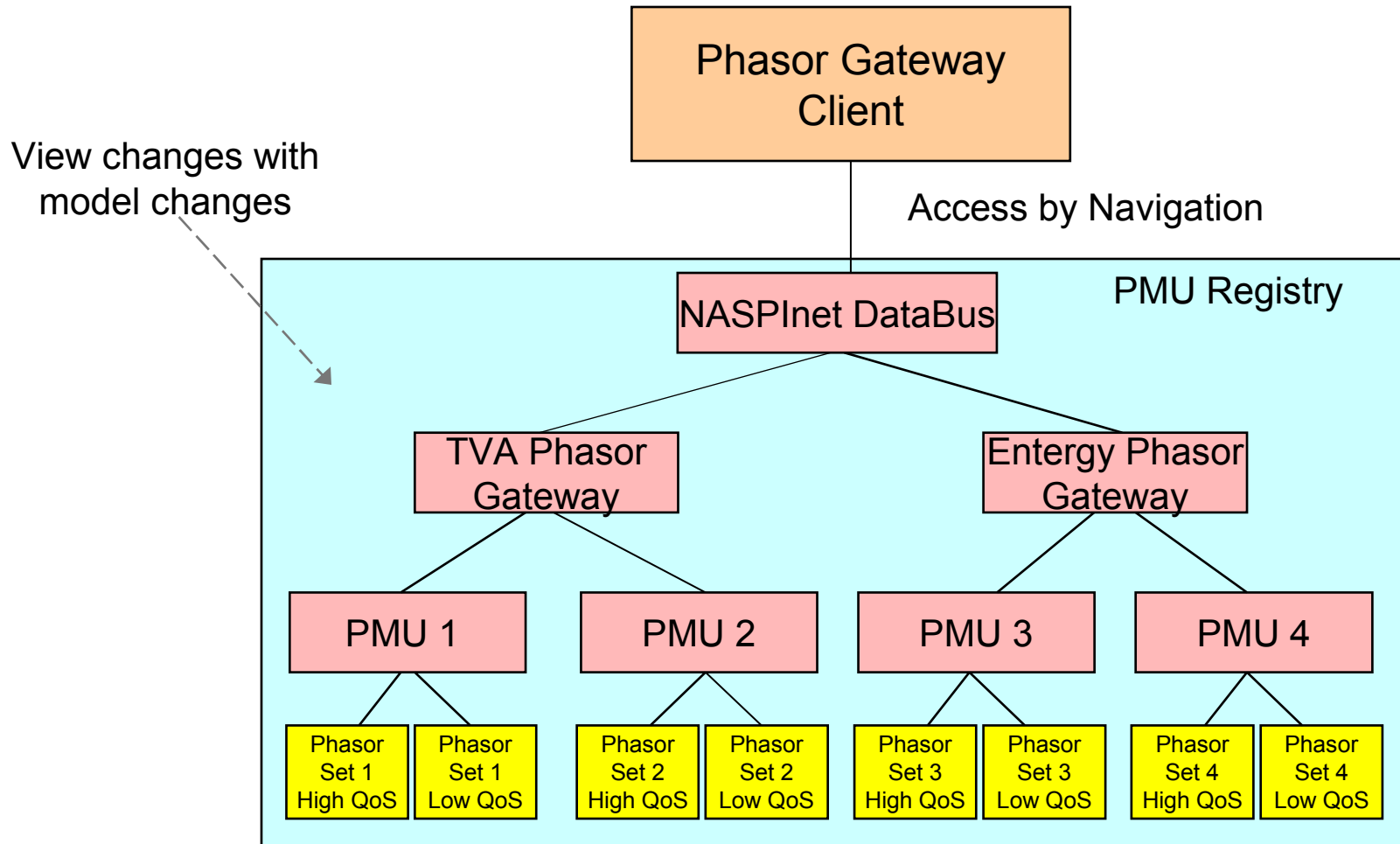- General Motors
- Boeing
- US Postal Service

OEMs

- ABB
- AREVA T&D
- General Electric
- Siemens
- Intergraph
- Power Costs
- OSIsoft
- Dranetz/BMI
- Telvent
- LS Industrial Systems
- Toshiba
- Schweitzer Engineering Labs
- Reinhausen
- Shandong Luneng
- Sifang Automation
- Doble Engineering
- XJ Electric
- …many resellers and integrators
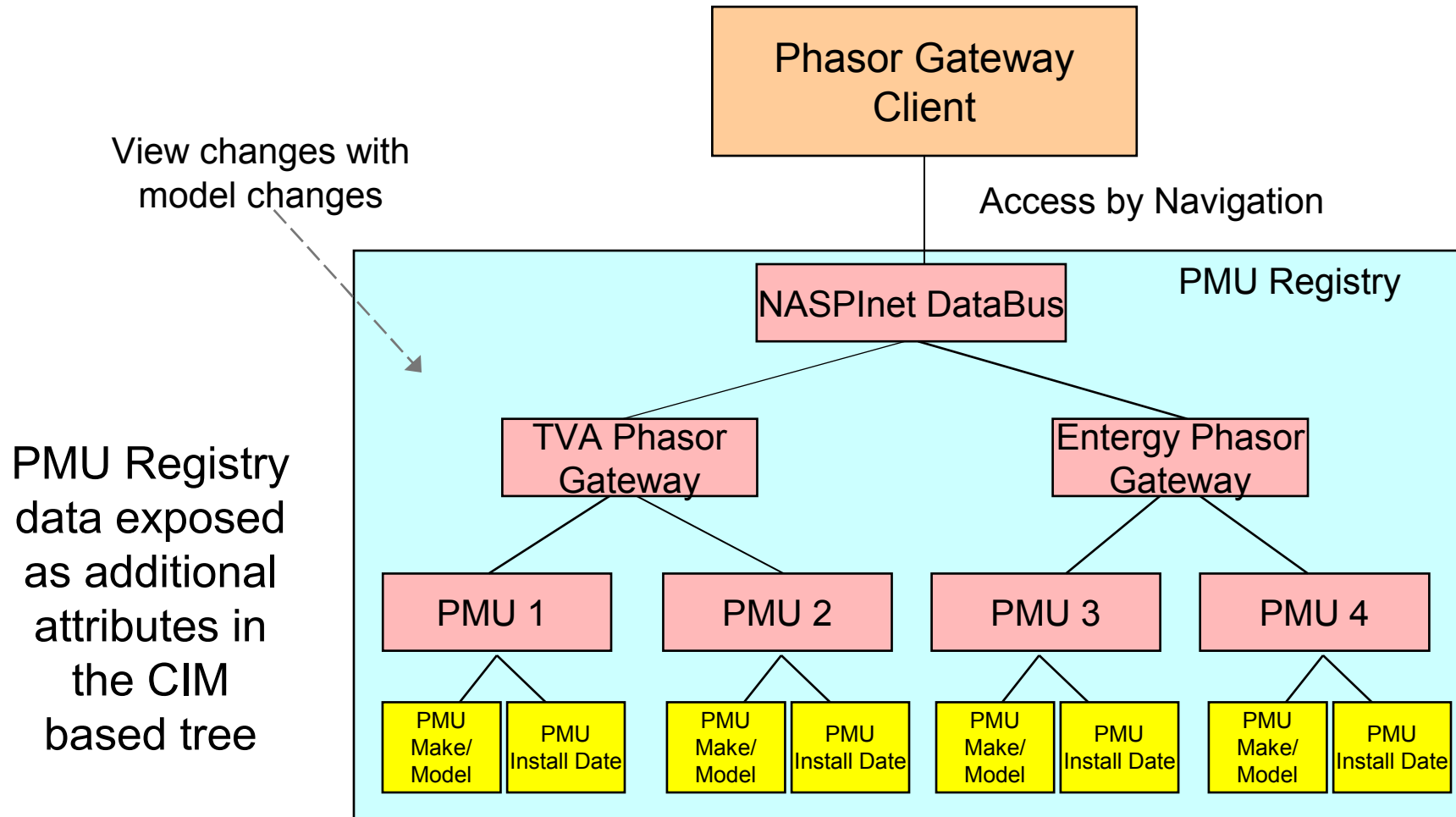
NASPI Architecture

- Use IEC 61850 90-5/C37.118 multicast for current phasor data .

- Use OPC API to isolate applications from the particulars of the NASPInet database protocols and services. (PDC's and archive require native 90-5 and C37.118 support)

- Use IEC 61970 OPC UA Web Services for historical phasor data as well as registry data, alarms, network model data and for NASPInet Data Bus Configuration.

- Expose merged phasor registry data with a CIM topology model.

Real-time

Historical

NASPInet Data Bus

Phasor Gateway

PDC

Current PMU Data Within The Context Of A CIM View

View changes with model changes

Phasor Gateway Client

Access by Navigation

PMU Registry

NASPInet DataBus

TVA Phasor Gateway

Entergy Phasor Gateway

PMU 1

PMU 2

PMU 3

PMU 4

Phasor Set 1 High QoS

Phasor Set 1 Low QoS

Phasor Set 2 High QoS

Phasor Set 2 Low QoS

Phasor Set 3 High QoS

Phasor Set 3 Low QoS

Phasor Set 4 High QoS

Phasor Set 4 Low QoS

PMU Registry Data Within The Context Of A CIM View

View changes with model changes

PMU Registry data exposed as additional attributes in the CIM based tree

Phasor Gateway Client

Access by Navigation

PMU Registry

NASPInet DataBus

TVA Phasor Gateway

Entergy Phasor Gateway

PMU 1   PMU 2   PMU 3   PMU 4

PMU Make/Model   PMU Install Date   PMU Make/Model   PMU Install Date   PMU Make/Model   PMU Install Date   PMU Make/Model   PMU Install Date

Example Based Phasor Gateway/PDC/Archive Architecture

Current phasor data

Current phasor data

PMU registry data as well as current and historical phasor data

Optional Standard OPC Interface

C37.118 Interface	IEC 61850 90-5 Interface	OPC UA Secure, Cross Platform Web Services

Phasor Data Cache/ Archivie

CIM Topology View

Data References

CIM XML file

EMS

Open PDC PMU Registry DB
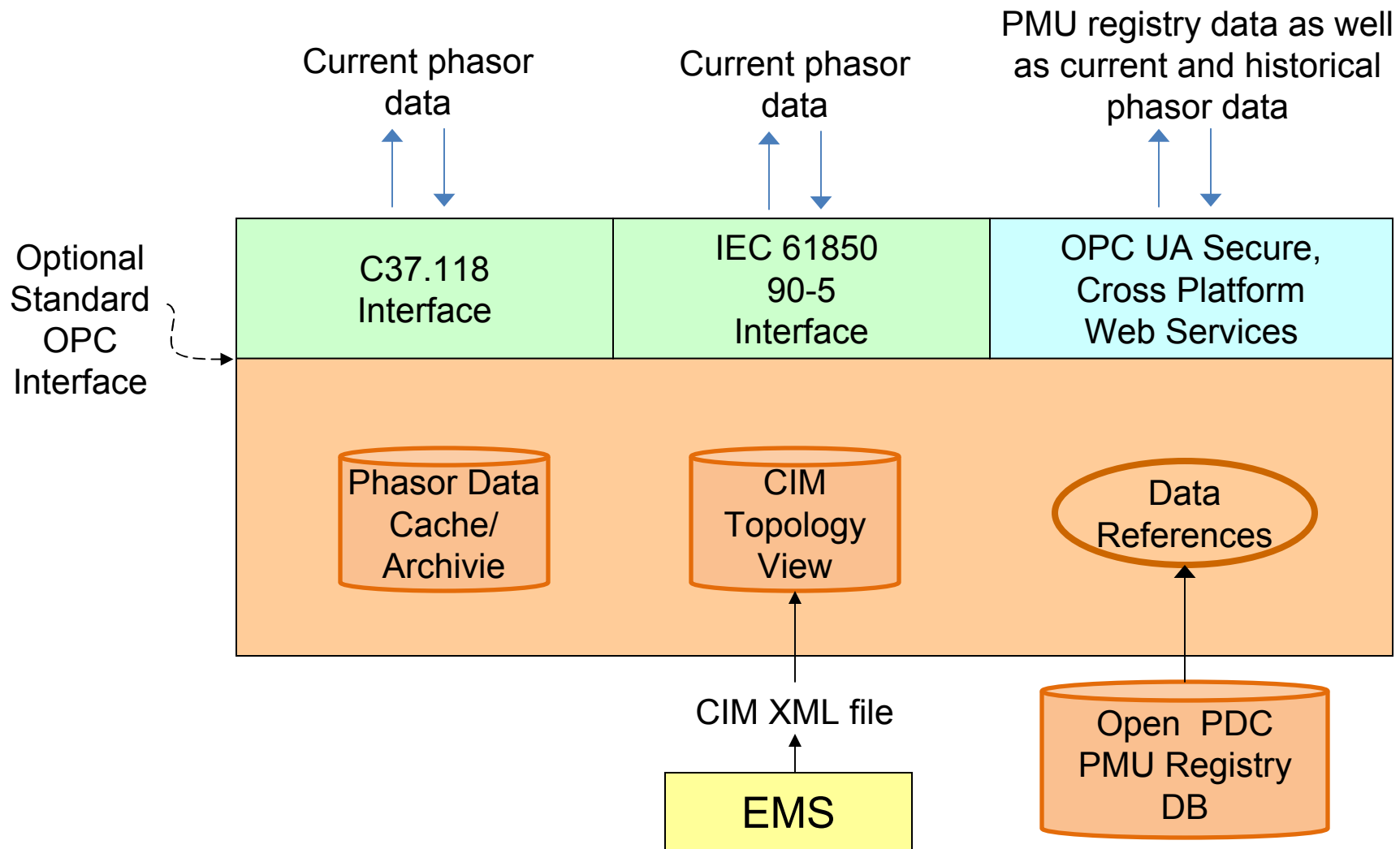
OPC UA Supports Model Driven Alarming (not in demo)

Current phasor data

Current phasor data

PMU registry data as well as current and historical phasor data **and Alarms**

Optional Standard OPC Interface

C37.118 Interface	IEC 61850 90-5 Interface	OPC UA Secure, Cross Platform Web Services

Phasor Data Cache/ Archivie

CIM Topology View

Data References

CIM XML file

EMS

Alarm

Open PDC PMU Registry DB

Notifications
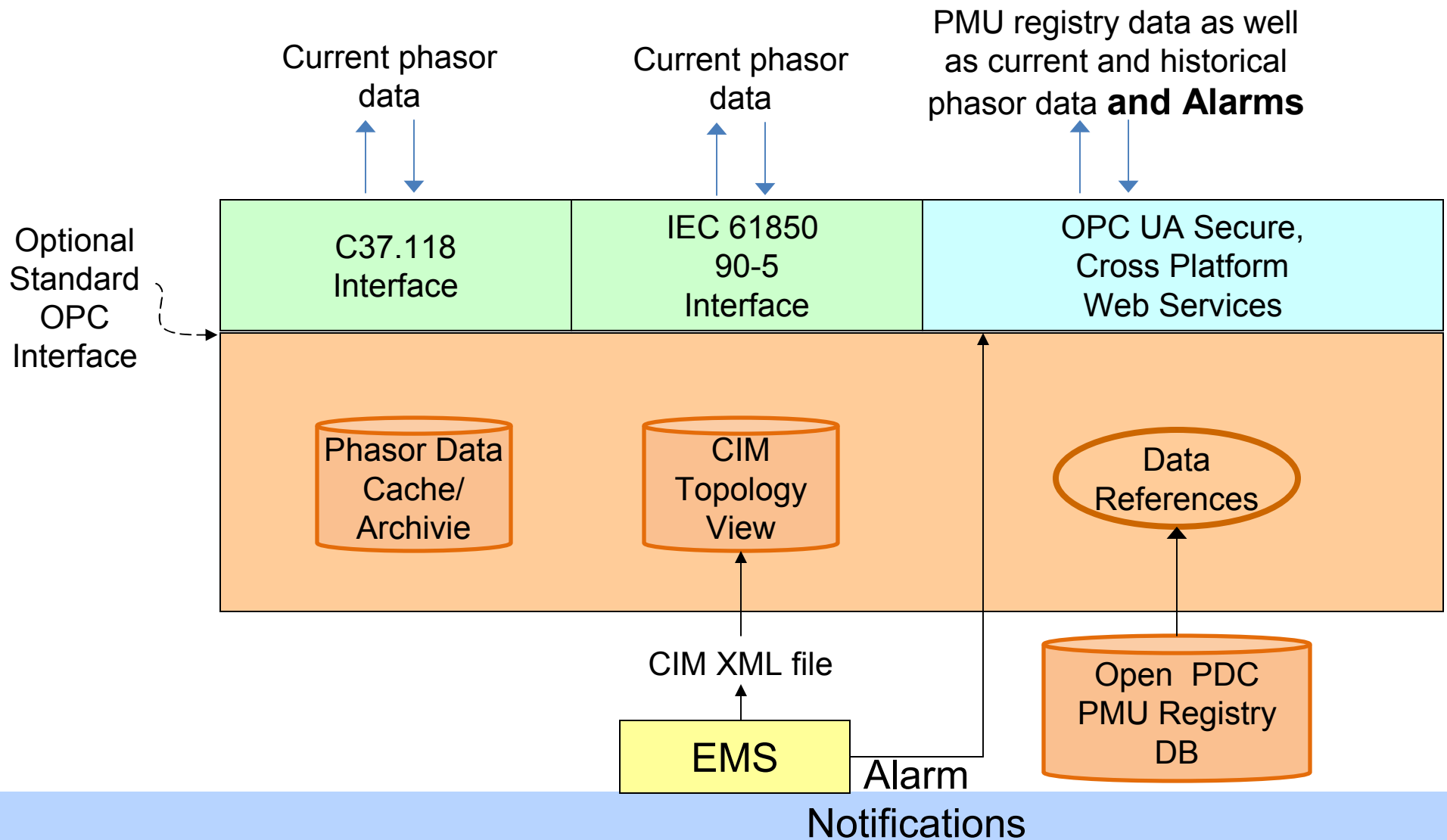
Common Information Model (CIM) is an object-oriented information model of the power system
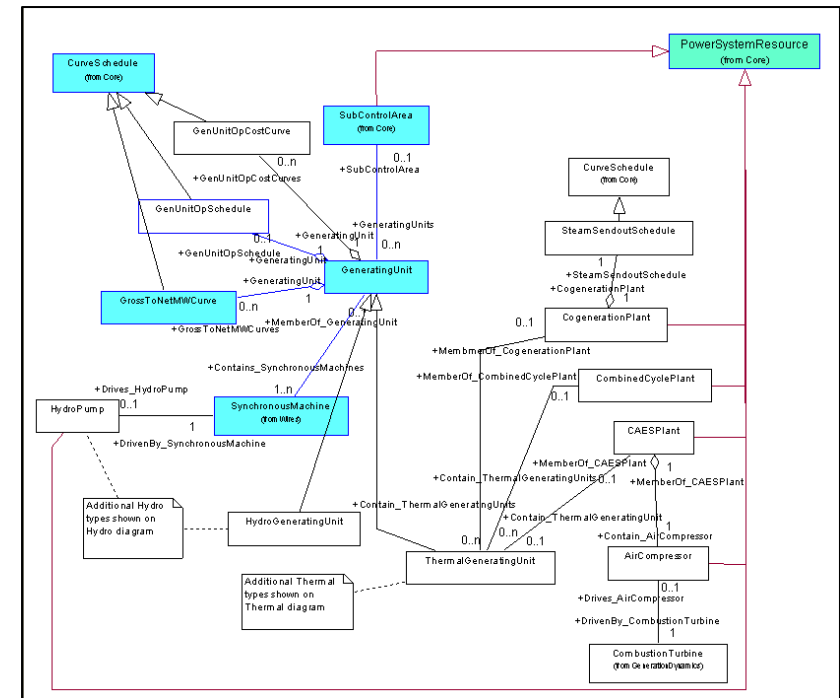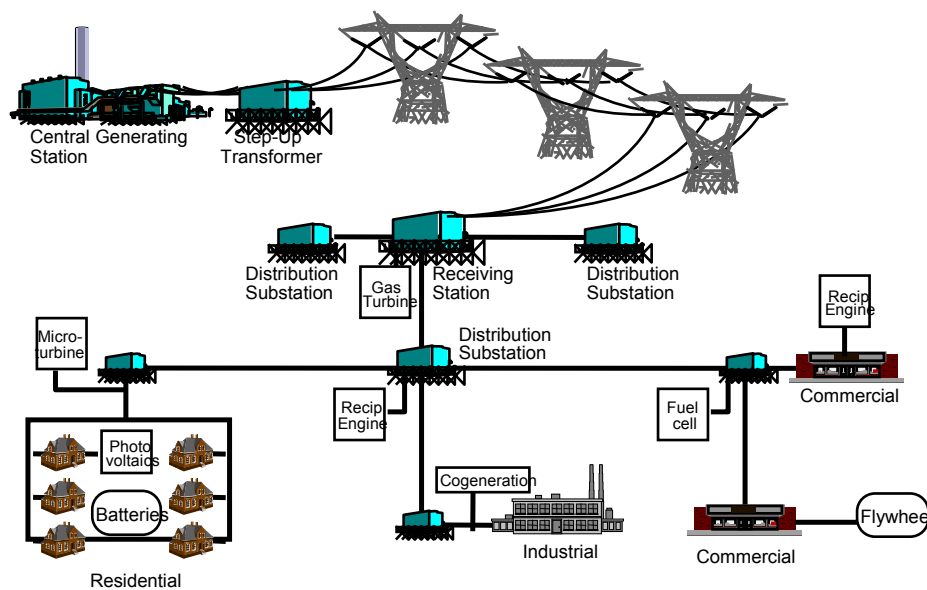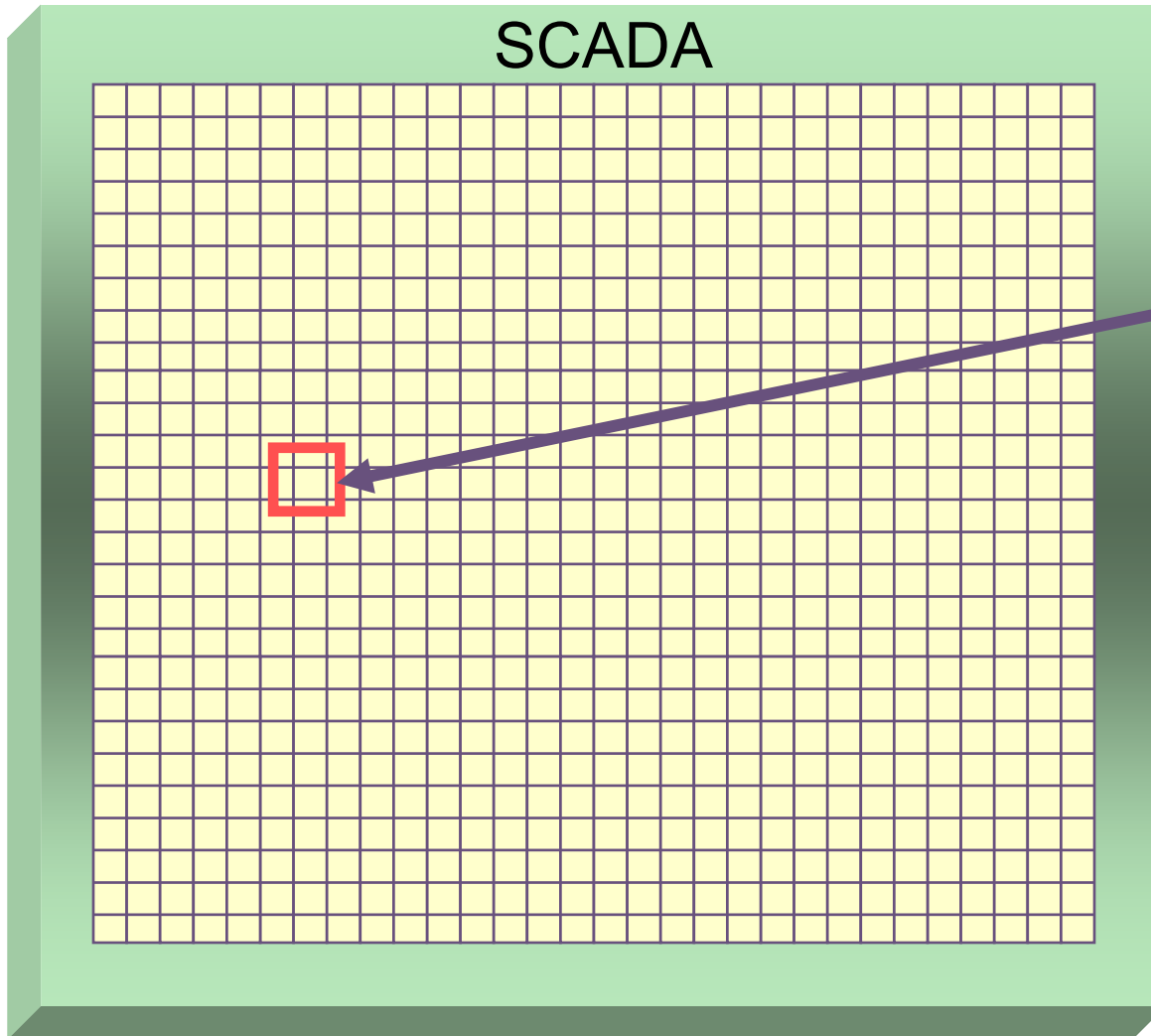

UML – Unified Modeling Language
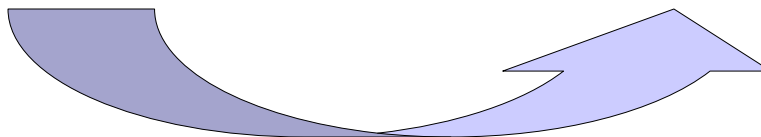
Benefits of Models

- Models give context and meaning to data improving integration and interoperability.

- The information contained in the model enables automation of setup and maintenance tasks.

- Model aware applications can be made independent of the data.

Legacy Data Model – Data is Referenced by Tag

SCADA

I need the primary current of the 345KV transformer in the airport substation
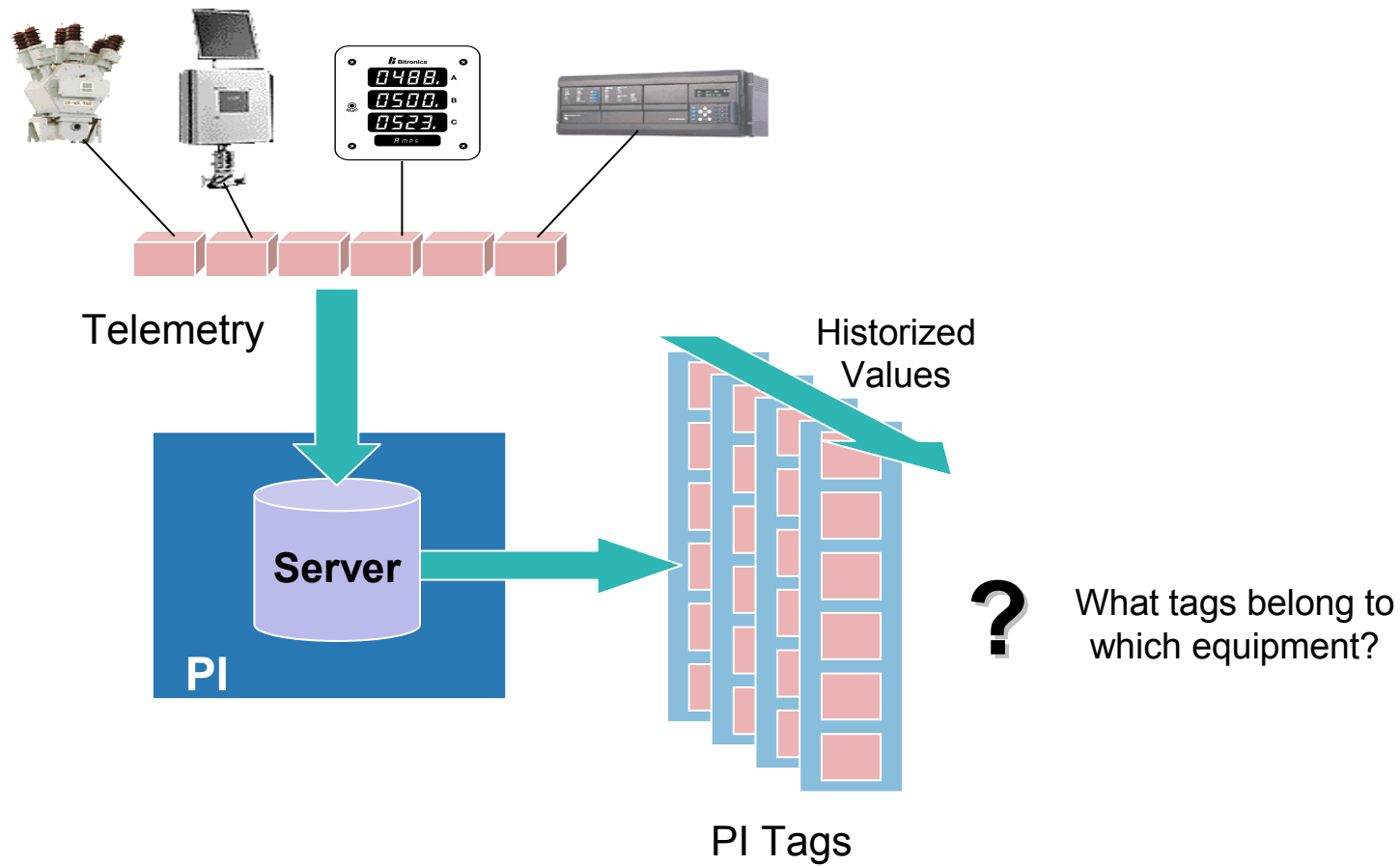
How do users find this today?
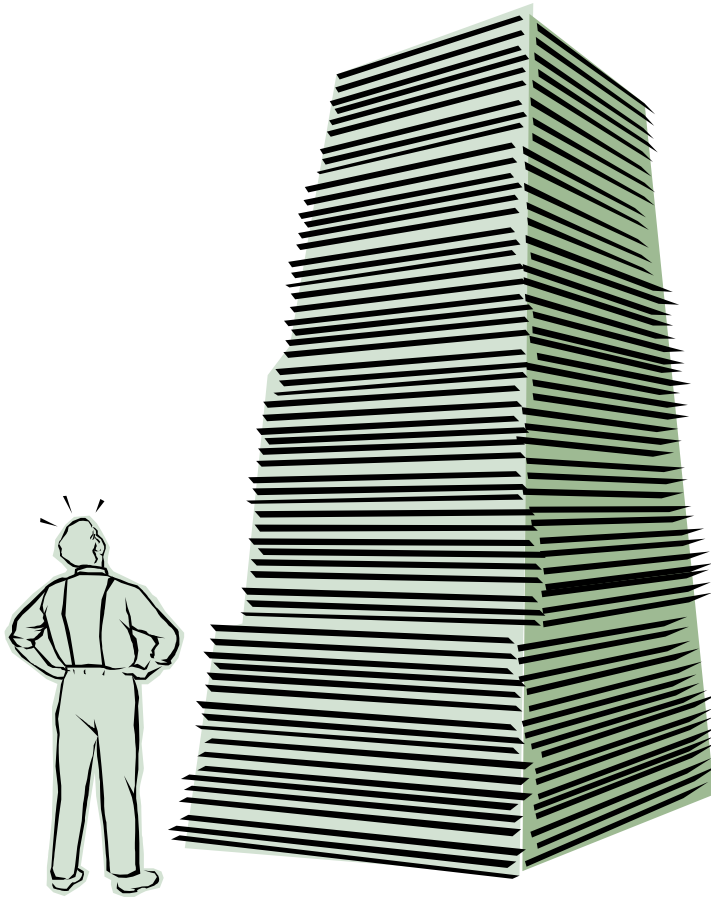
With lots of paper documentation and manual maintenance effort subject to manual error detection and correction.

SISCO UIB Adapter for PI

- Brings power system models to the OSIsoft PI archive system

- Allows PI data to be viewed in the context of the power system model within the PI application environment

- Supports the EPRI CIM model or any user specific model via XML

- Includes OPC Server and Client Adapters:

  - PI access to any UIB data source

  - UIB clients can access PI data

- Can be used with or without UIB for external applications

Tag Based Access

Telemetry

Server

PI

Historized Values

? What tags belong to which equipment?

PI Tags

CIM Based Data Access

Telemetry

Historized
Models **and**
Values

Archive — DATA

MDB
or AF — MODELS

PI

Data Relationships
are now visible
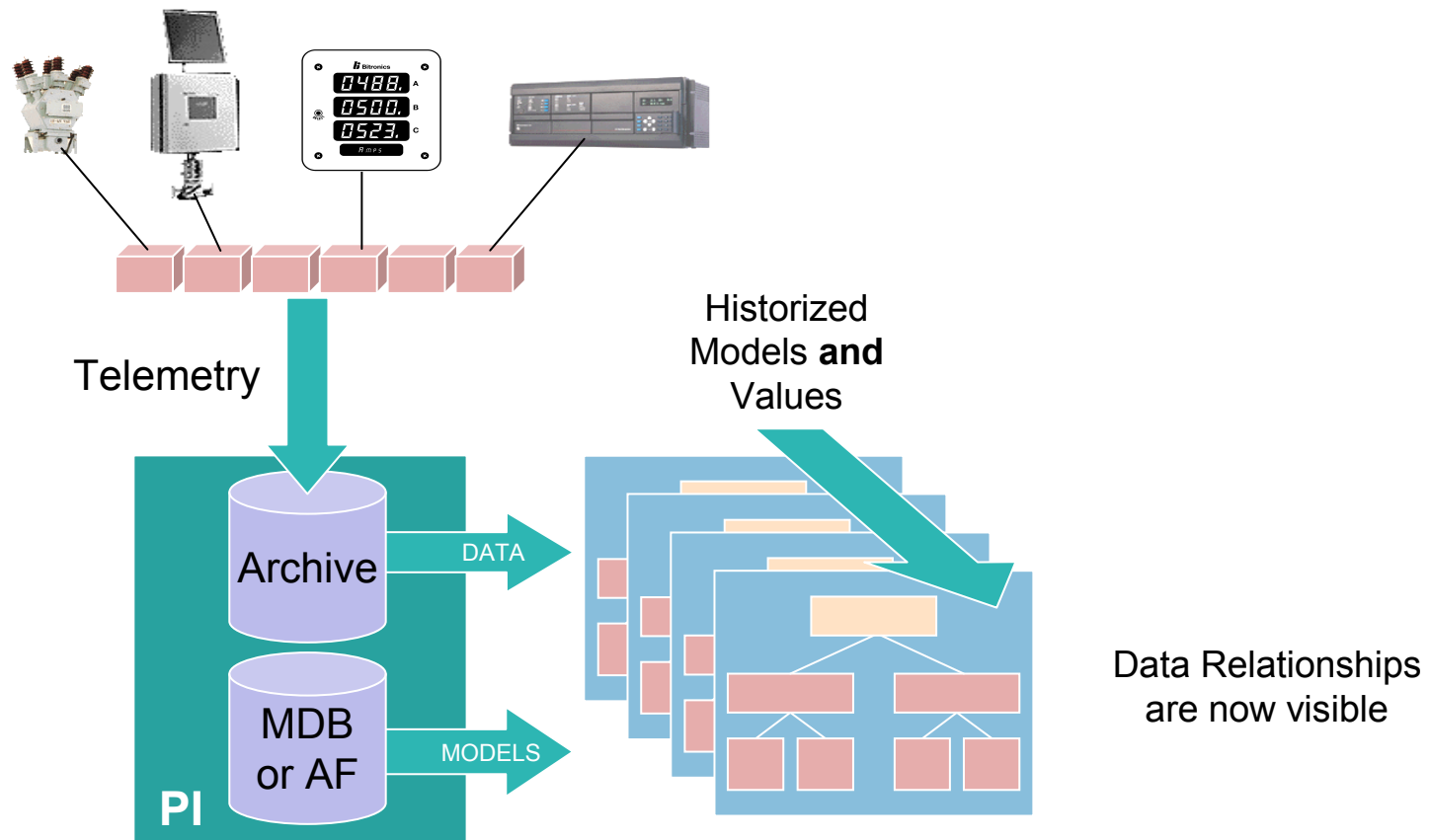
UIB Adapter Application

PI

Archive MDB or AF

Data

Models

PI Interface

UIB Adapter for PI

Standard Interface

Model-Driven Application Access

SISCO Control

X

PI ProcessBook

CIM Model/Schema Definitions

XML

XML

CIM Model Instance Information

Other CIM Applications

SISCO UIB

CIM

External Model Repository

Model Population and Synchronization

CIM Based PMU Registry in PI AF

SMS
- Layers
- ClassView
  - ACLineSegment
  - Analog
  - AnalogValue
  - BaseVoltage
  - Breaker
  - BusbarSection
  - ConformLoad
  - ConformLoadGroup
  - ConnectivityNode
  - CurveData
  - DataObject
  - Disconnector
  - GeographicalRegion
    - Western Control Area
      - PG&E Control Area
        - AIRPORT Substation
          - PG&E Control Area
          - TXAP
          - VL_AIRP_230
            - AIRPORT Substation
            - APLOAD
            - BV_230
            - CN11
              - AIR_CN11_APLOAD Terminal
              - AIR_CN11_LBS Terminal
              - Node11
                - Measurement1
                  - L1-N Voltage Measurement Value
                    - L1-N Voltage Measurement
                    - SCADA 00000324
              - PMU1
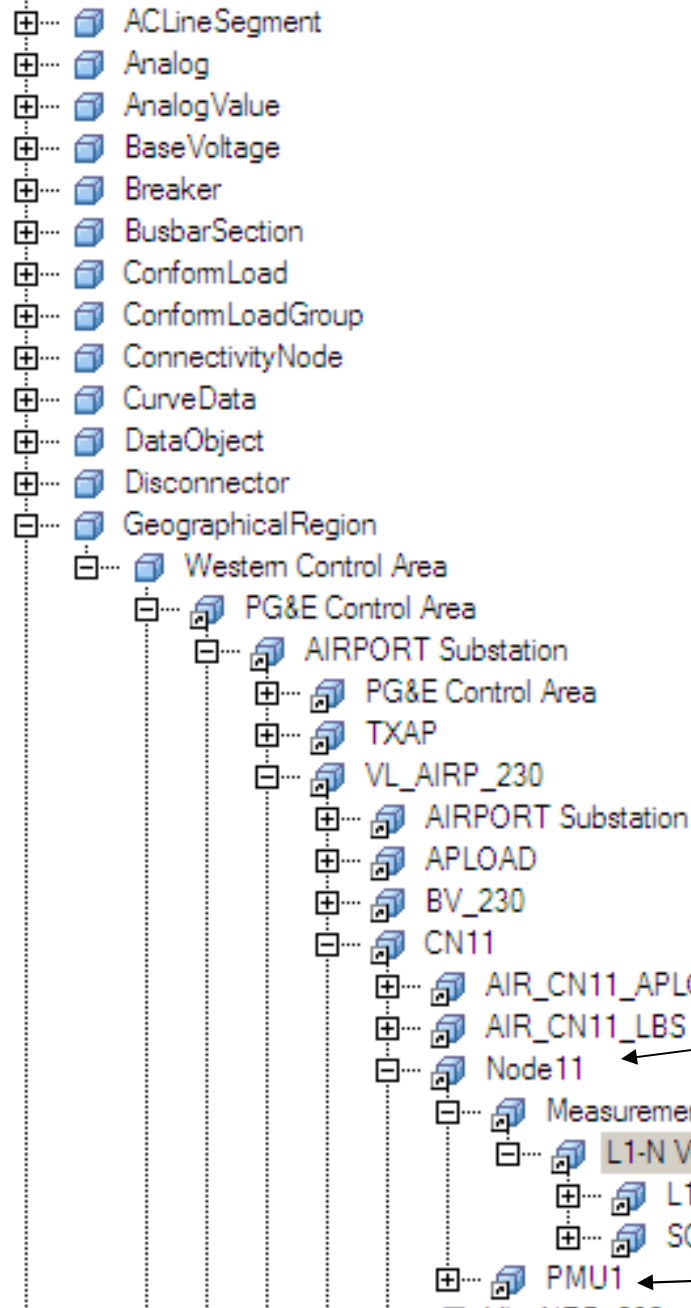
CIM data from a CIM XML file

Node record from the Open PDC PMU Registry DB

CIM Measurement Value containing current and historical phasor data.

Device record from the Open PDC PMU Registry DB

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Thank You

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