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Data Management Using CIM and IEC 61850

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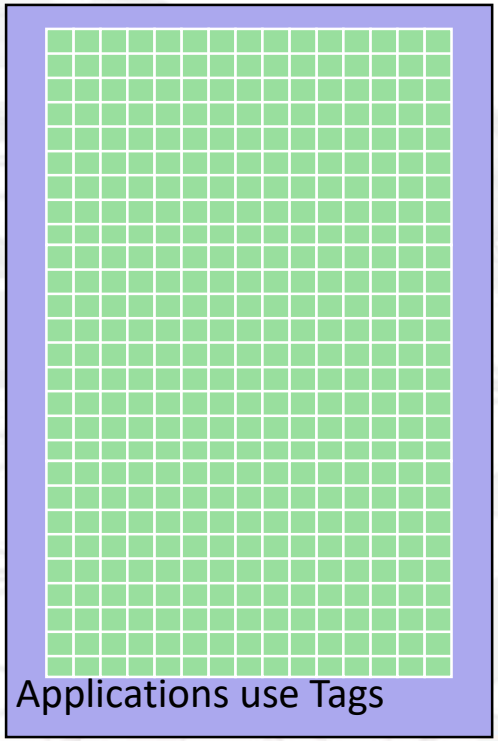
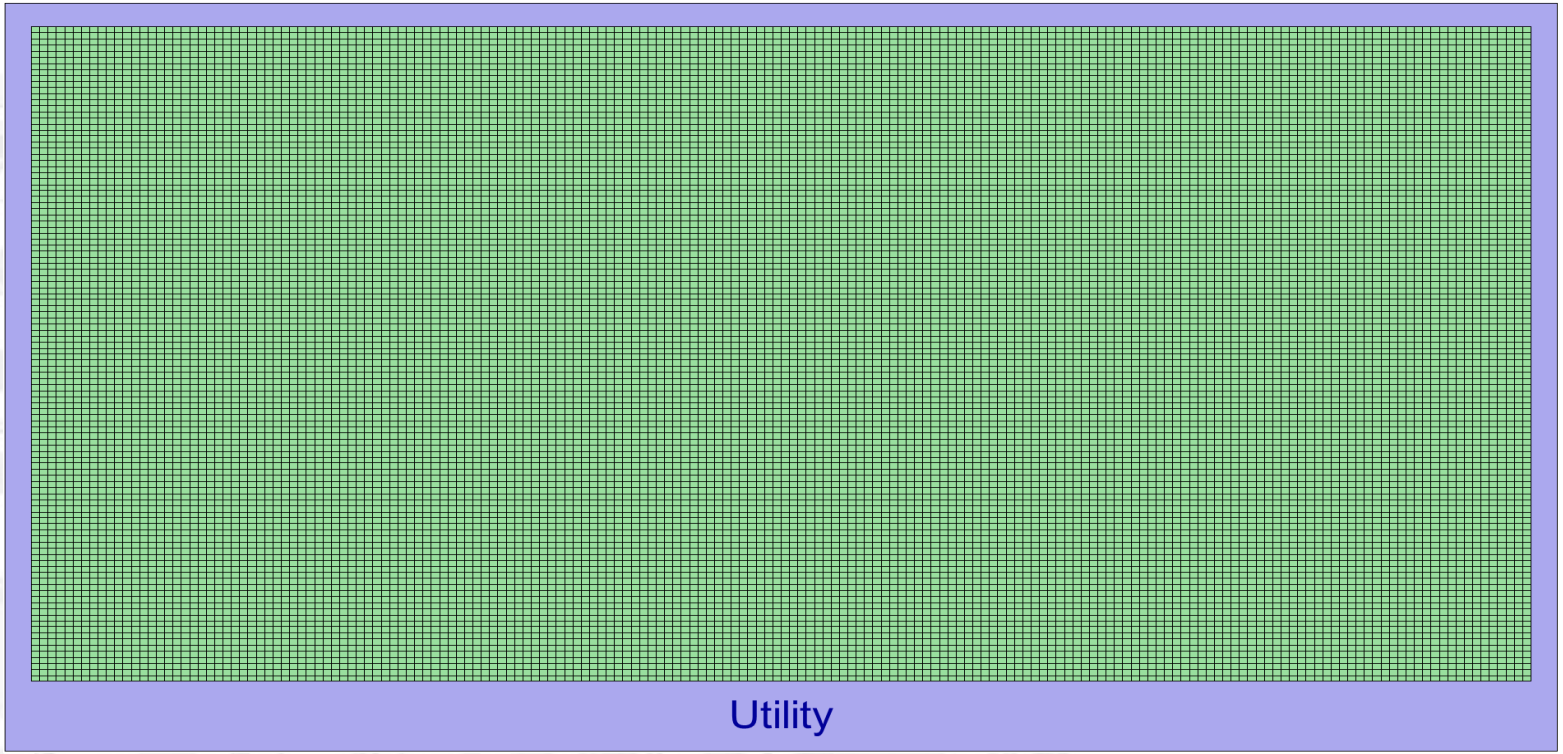
UCAIug at CIGRÉ 2018
Stand 335

The Legacy Data Model Has Always Worked



Why do I want the “complexity” of the CIM and all this modeling stuff? Tags are simple!

Scale The Legacy Data Model Up to the Smart Grid



If it takes 15 seconds to configure a tag, it would take 26 man-years to configure 2M meters!

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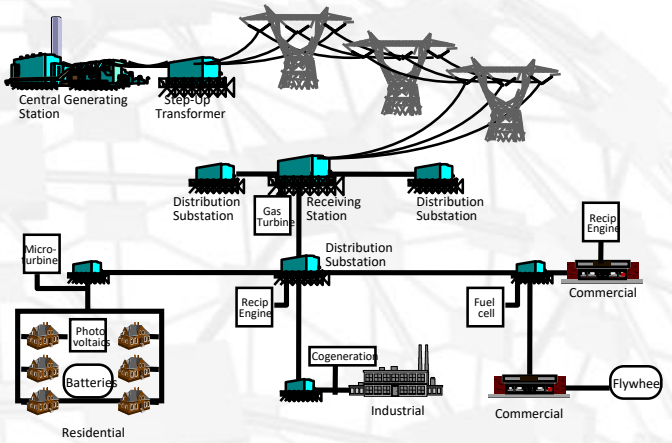
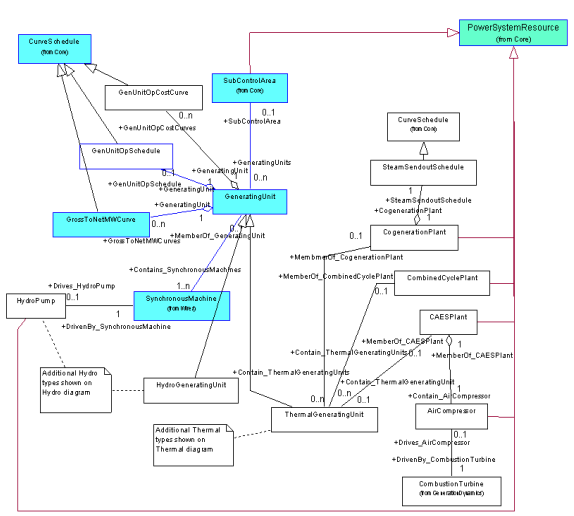
How do users handle this today?

With paper documentation and manual data base maintenance effort subject to manual error detection and correction.

Resulting in many hours of work

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





UML – Unified Modeling Language

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Using CIM and IEC 61850 Together

- CIM is a very complete utility wide power system model
- IEC 61850 combines substation power system and device models
- CIM and IEC 61850 can be linked and used together using UML

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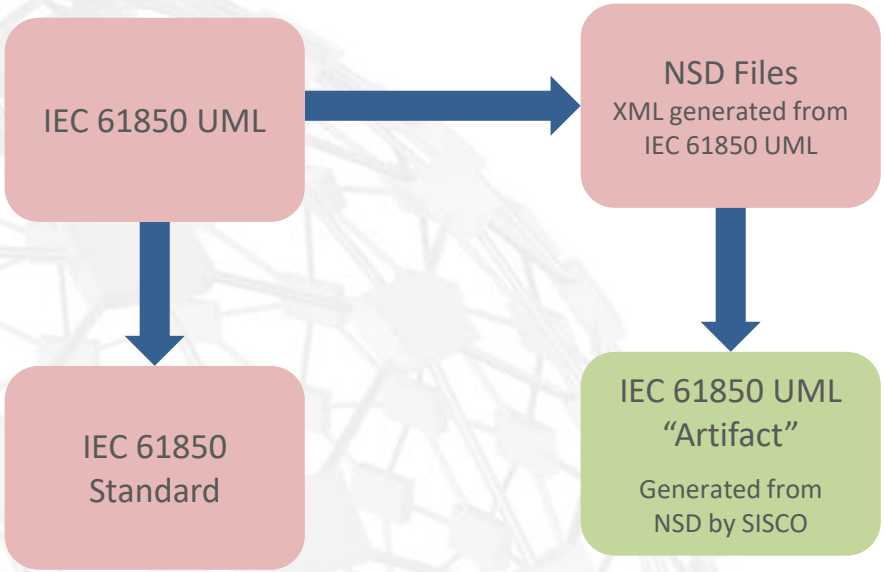
Deriving the UML for IEC 61850



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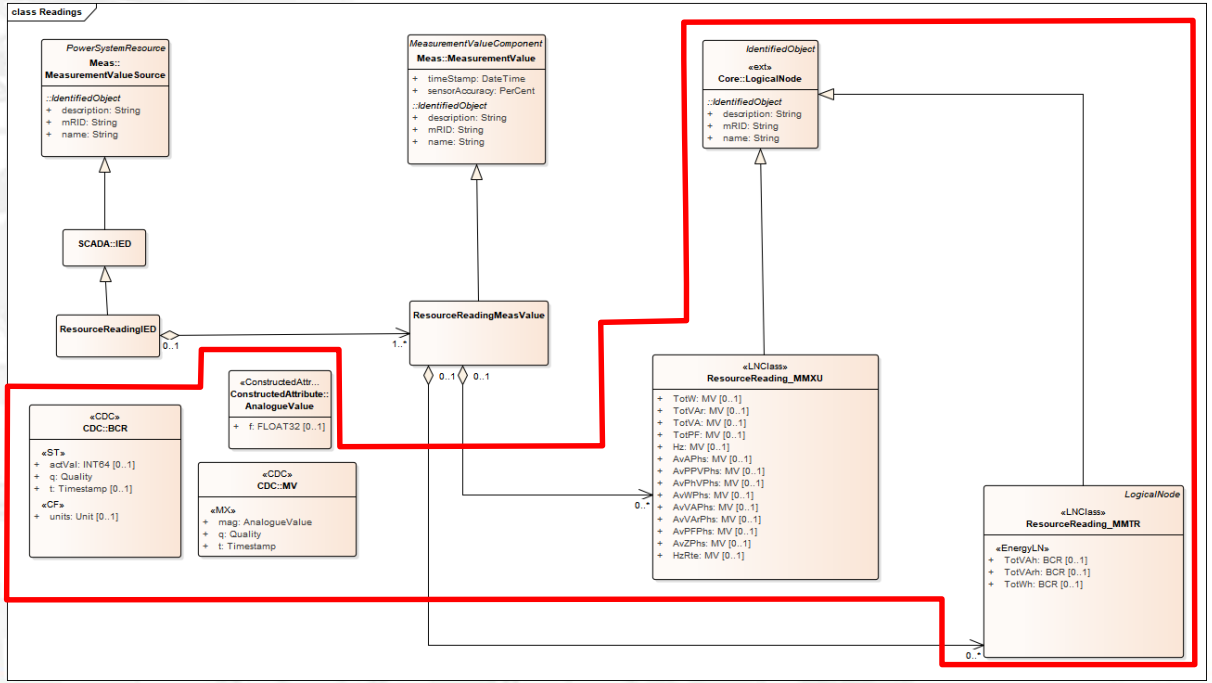
CIM and IEC 61850 Used Together for Data Modelling From the Enterprise to the Device



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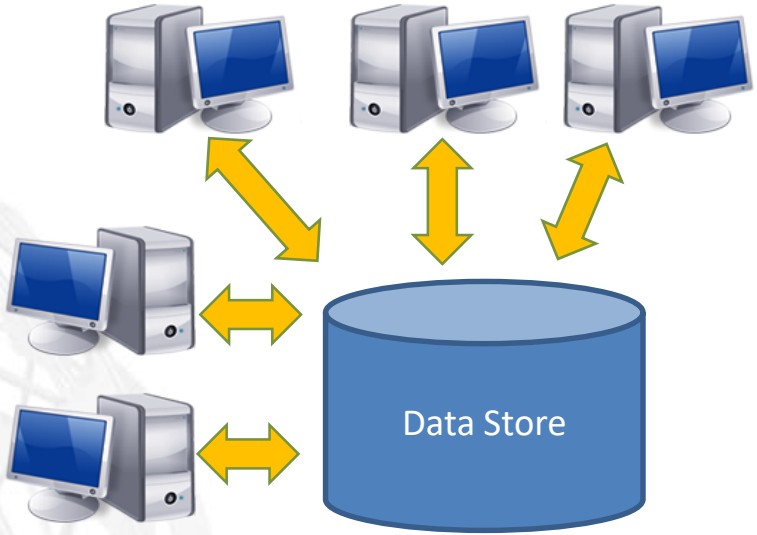
Using CIM and IEC 61850 for Data Modeling

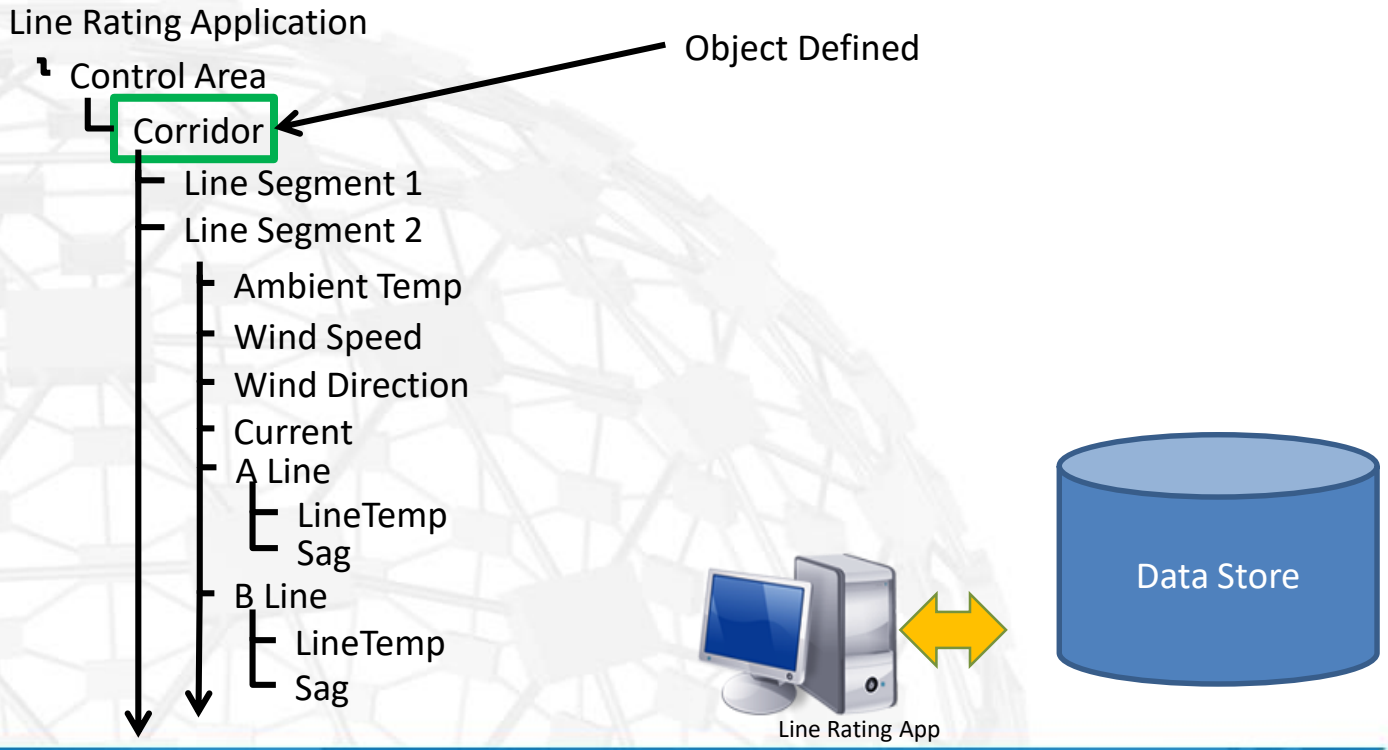
How to Use a Disciplined Approach to Data Management

Legacy Approach for Analytic Data Modeling

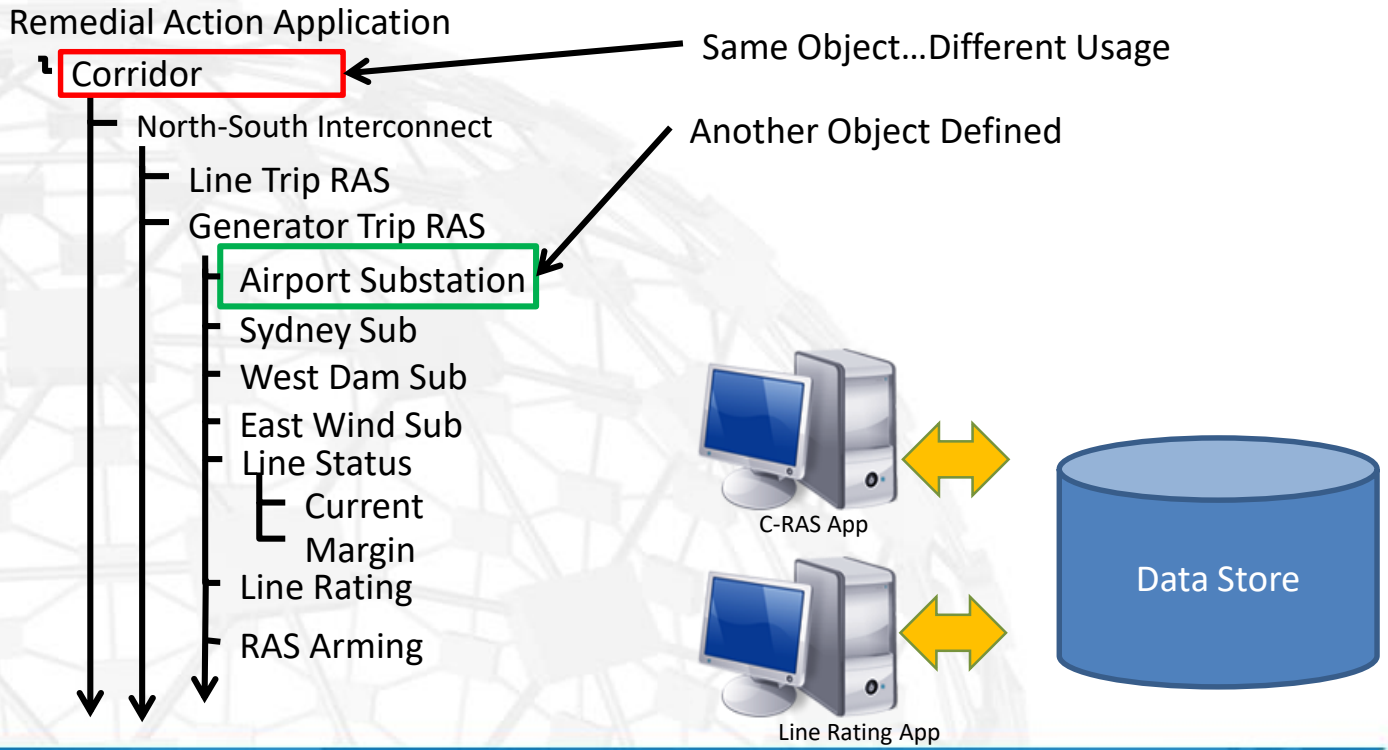
- Each group looks at its own application needs and develops a data model that is optimized for its own use:
  - Only data needed for its application is considered.
  - New data model elements are added as needed based on needs of individual applications.
- The “Ad-Hoc” Approach



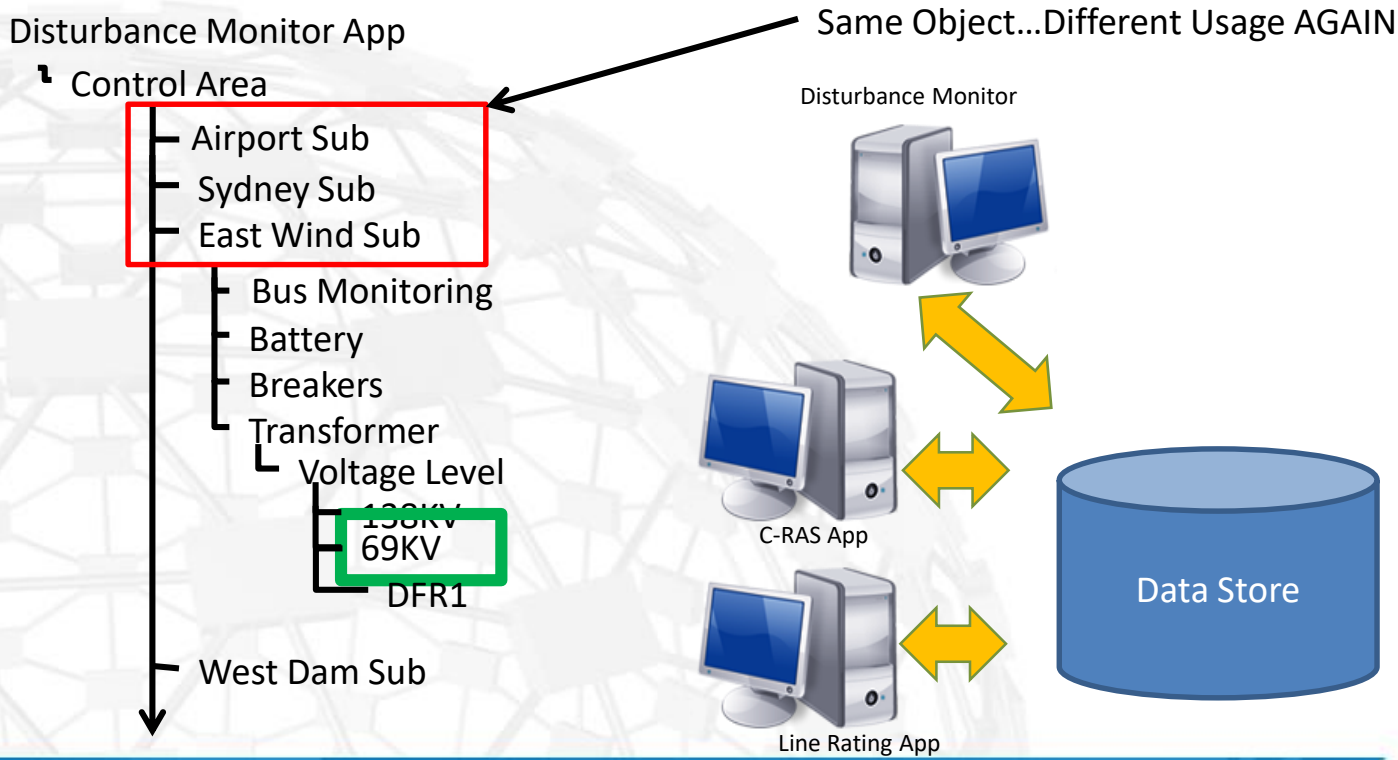
Ad Hoc Approach for Line Rating Application



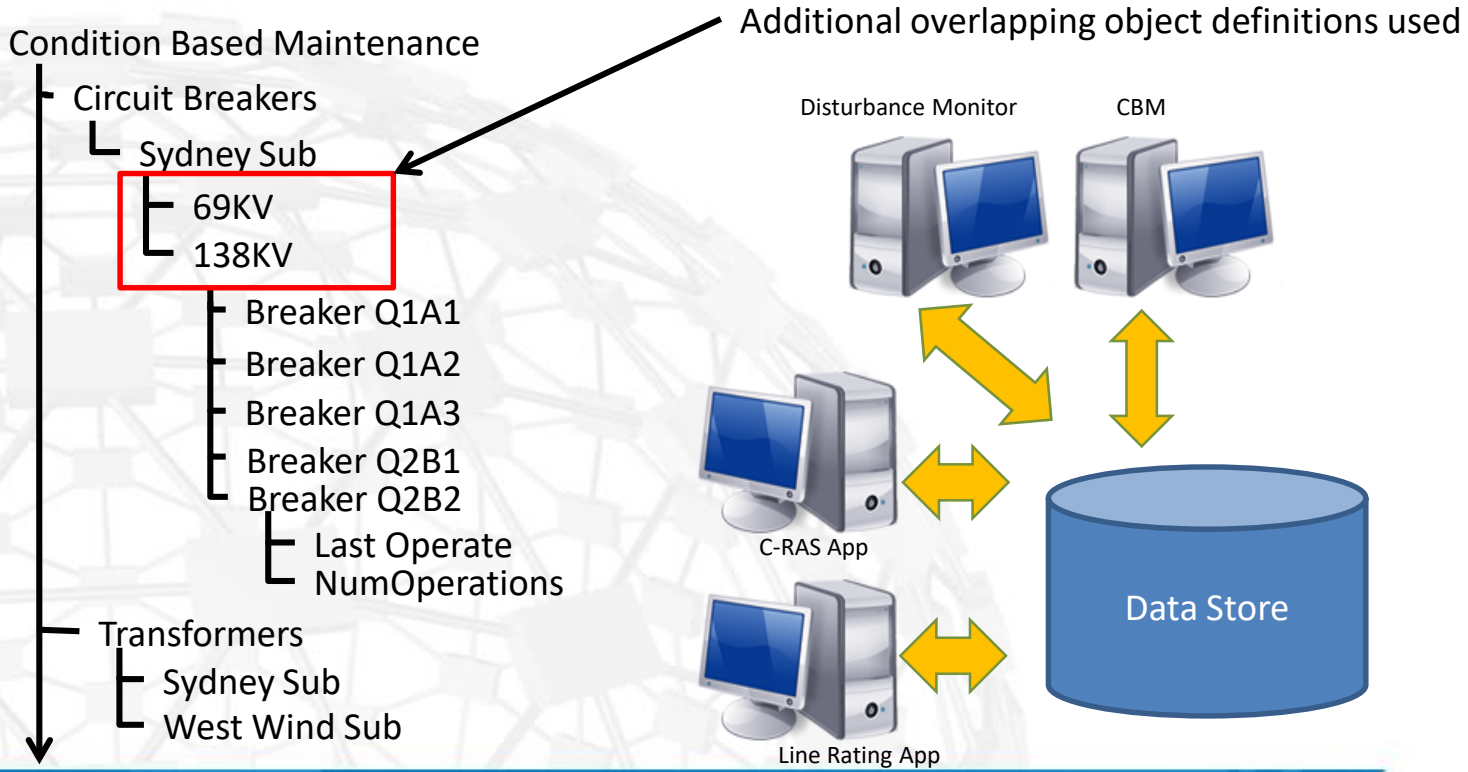
Ad Hoc Approach for Remedial Action Schemes



Ad Hoc Approach for Disturbance Monitoring

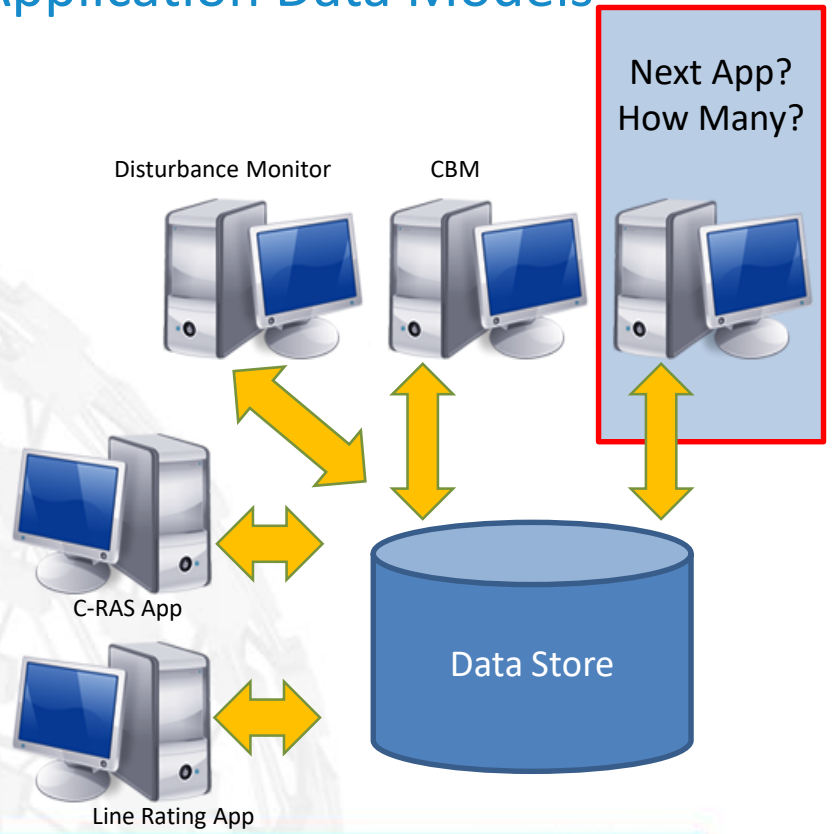


Ad Hoc Approach for CBM Applications



Impact of Ad Hoc Approach for Application Data Models

- Each Application has its own data model.
- Impact of cross-organizational integration and data sharing ignored.
- Each group is individually satisfied with their own custom view until…..



Change Happens

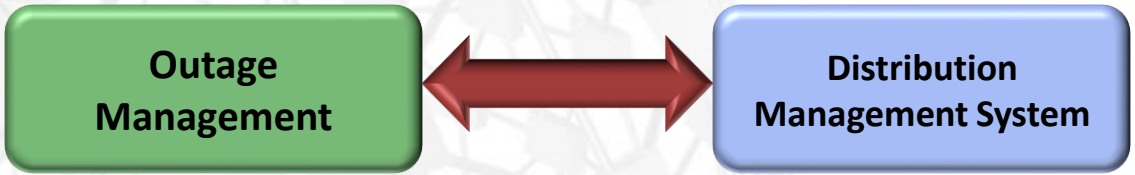
- Addressing change becomes too difficult when each application uses its own incompatible data modeling:
  - Business needs demand organizational changes and new levels of data sharing and integration.
  - New technology must be addressed (e.g. renewables, DER, “deregulation”, etc.

- Result: **Application rewrites, reintegration, project delays, barriers to data sharing.**

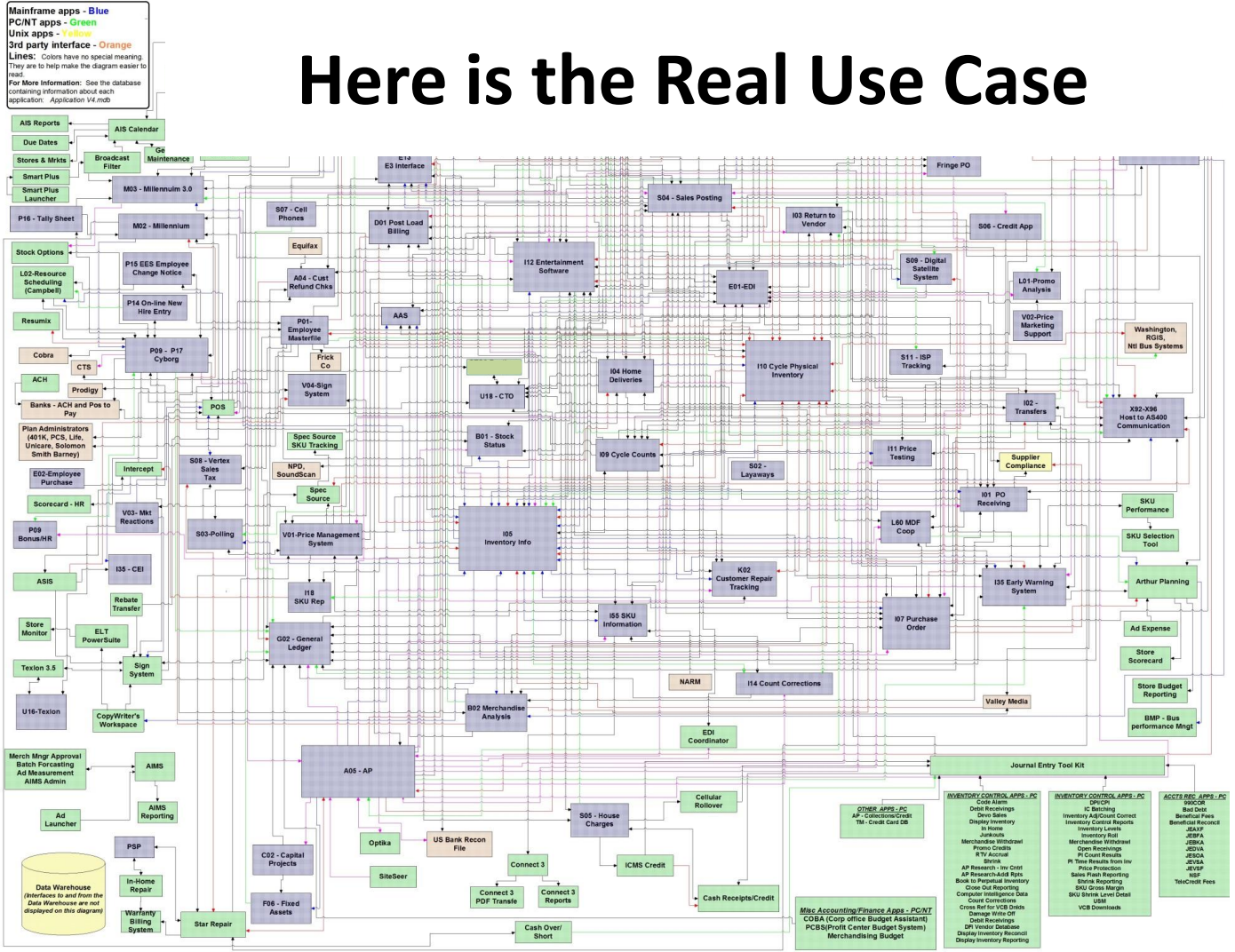
- **The “Bigger” the data, the bigger the negative impact will be of not using a common data model.**

How Does This Happen?

- Misunderstanding the Integration Use Case
  - The tendency is to focus only on the specific project at hand
  - Ignores the long-term cost and complexity of trying to do many projects
- Is this is the use case that drives choices (for example)?



Here is the Real Use Case

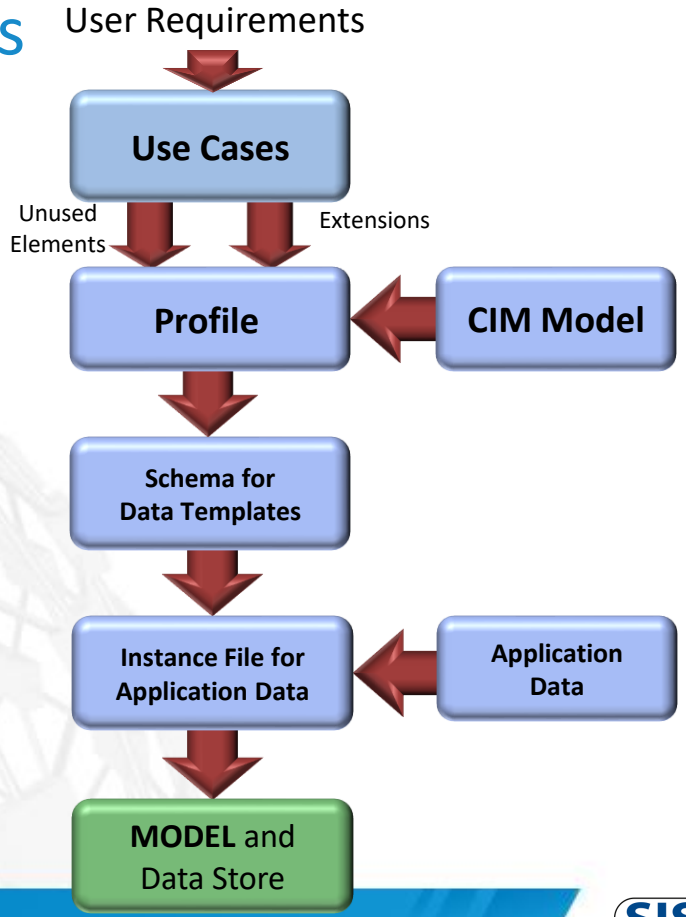


CIM Is The Only Choice for the Model-Driven Utility

- Developing your own comprehensive utility data model to replace CIM will take many decades of effort
    - How many world-class experts can your utility hire to design this from scratch?
- CIM is specifically designed to be adapted to fit the needs of individual utility use cases:
    - Extensions and Profiles
    - Messages and Integration Patterns
- New applications can extend independently yet share the existing models where needs overlap without breaking existing applications and integration
- SISCO's CIM Adapter for PI brings these benefits to the PI System
- CIM is not the easiest way to do any **one thing**. CIM is the only way to do **everything**.

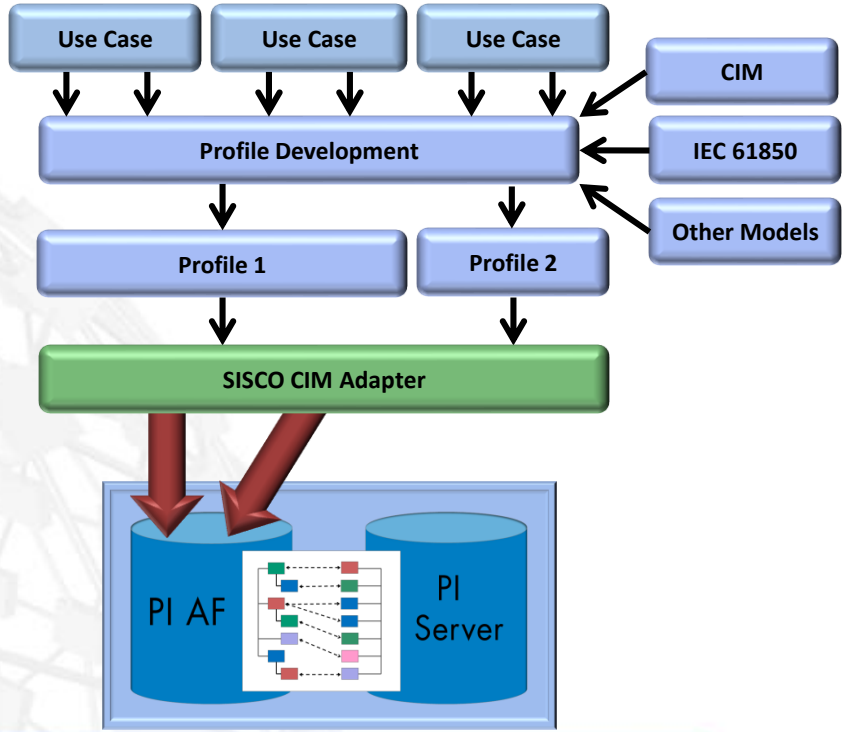
The CIM Model-Driven Process

- CIM is flexible to accommodate:
  - Extensions for non-standard business needs
  - Eliminate the complexity of unused models
- Profiles are created based on use cases to address your specific needs
- Instances created to relate existing data to the CIM Profile schema
- Model used to configure analytics.
- Applications use models to access data eliminating custom tag name dependency.



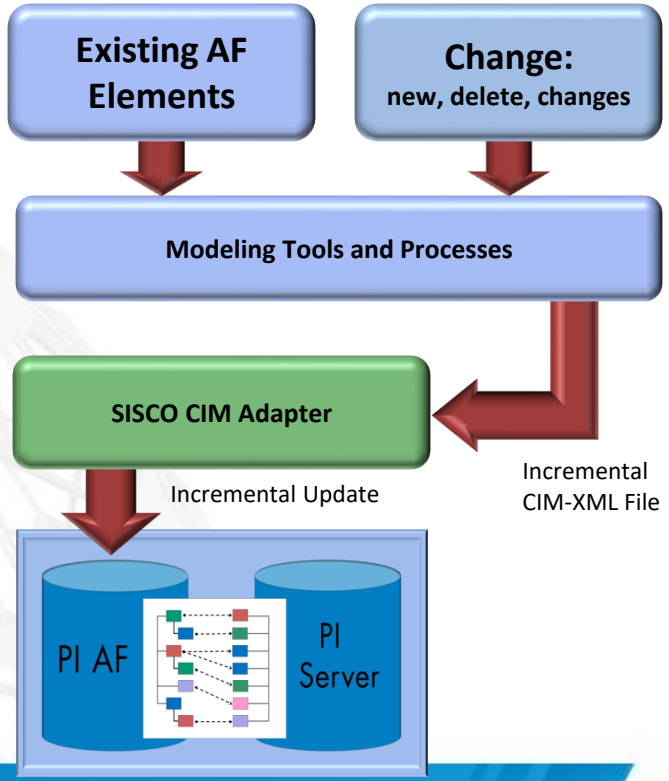
CIM Adapter and PI AF Deliver Flexibility

- Multiple uses cases can be addressed with one profile.
- Multiple profiles can be supported for use cases that can't share a profile
- PI AF is flexible to support many models
- A disciplined modeling process with SISCO CIM Adapter brings it all into the PI System



CIM Adapter Helps You Embrace Change

- The model driven process captures change and creates incremental updates
- SISCO CIM Adapter incrementally updates PI AF models.
- The individual hierarchies can be updated and kept synchronized with each other.



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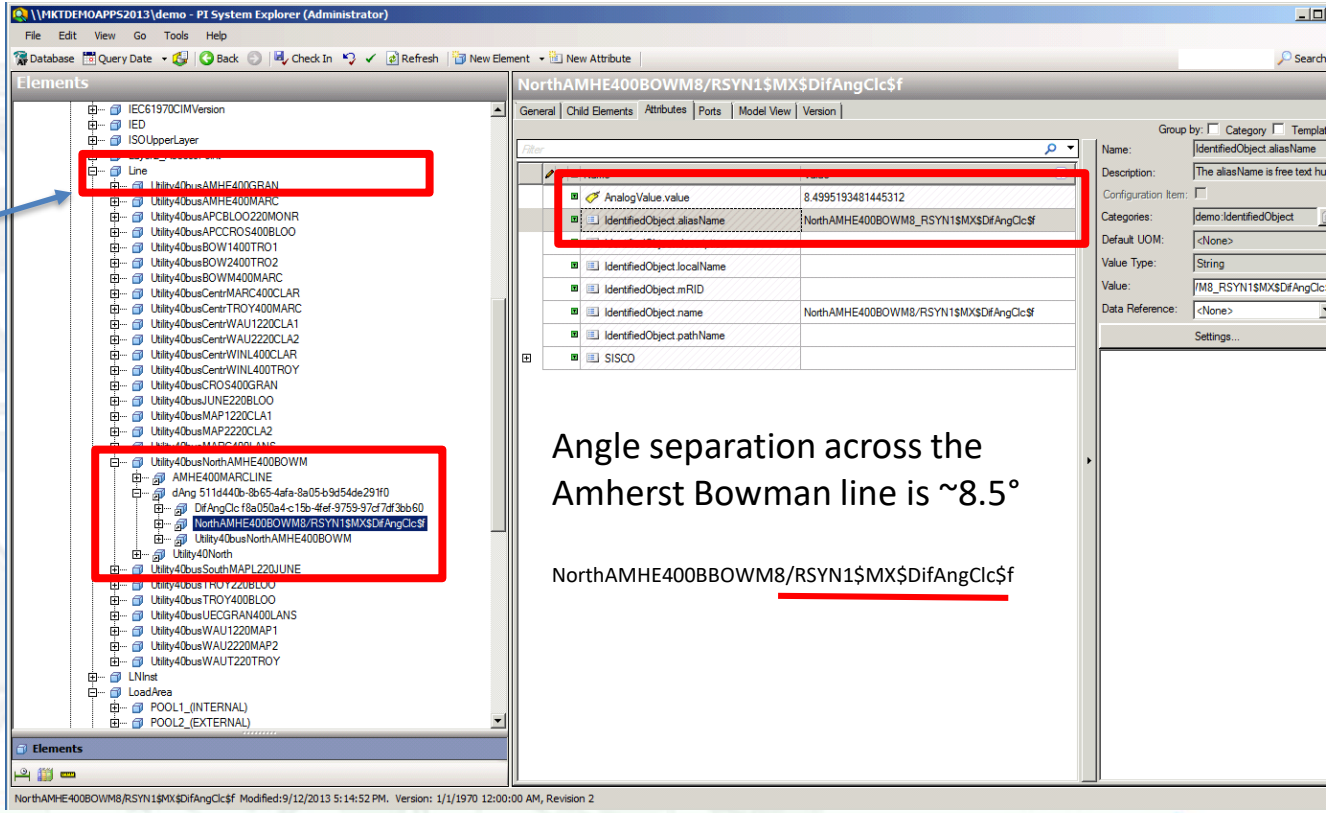
Result of CIM-IEC 61850 Integration in PI AF

Classes per CIM with Extensions

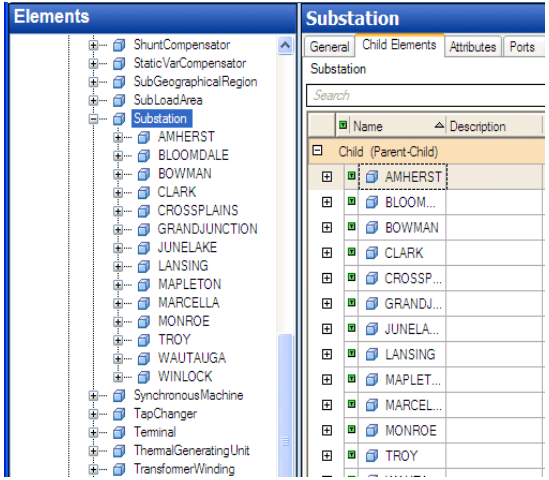


Angle separation across the Amherst Bowman line is ~8.5°

NorthAMHE400BBOWM8/RSYN1MXDifAngClc$f

Summary

- CIM and IEC 61850 are pre-existing standardized utility oriented data models that provides a platform to build an application data model that addresses enterprise level needs.
- PI AF and SISCO CIM Adapter provide an excellent foundation to support effective application of application data models for utilities.



Business Challenge

- Taking advantage of application data models that meets individual group needs while supporting enterprise wide integration and data sharing that can be adapted to changes.

Solution

- PI AF to organize all PI System data
- SISCO CIM Adapter to automate PI AF modeling
- CIM based model driven process to manage change

Results and Benefits

- A single enterprise level model for PI AF that can be optimized for individual application needs
- Flexibility to minimize effort adapting to change

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Thank You

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