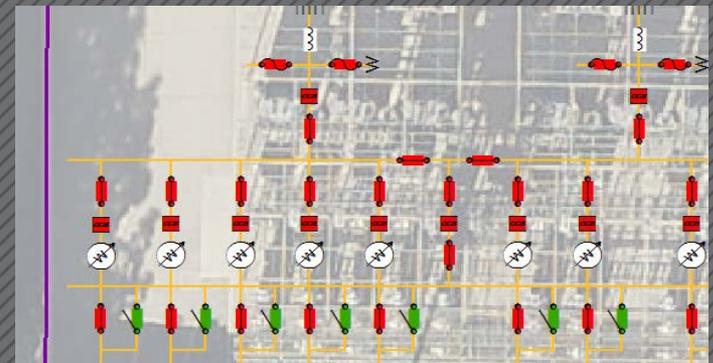


CIGRE GOTF 2017

A Data Approach to ADMS



Information Technology
Meets
Operational Technology



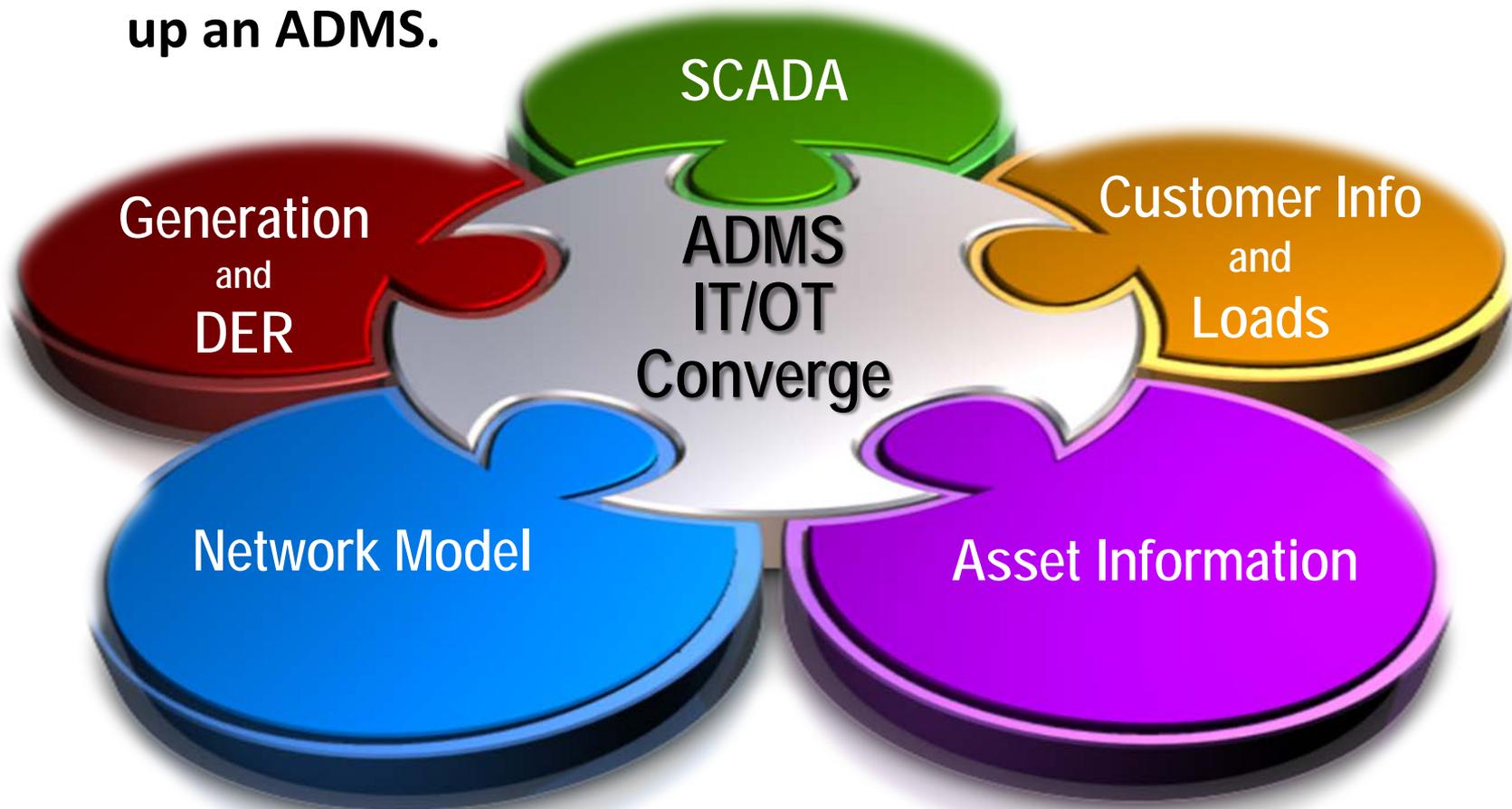
Presented by: Larry Wilke



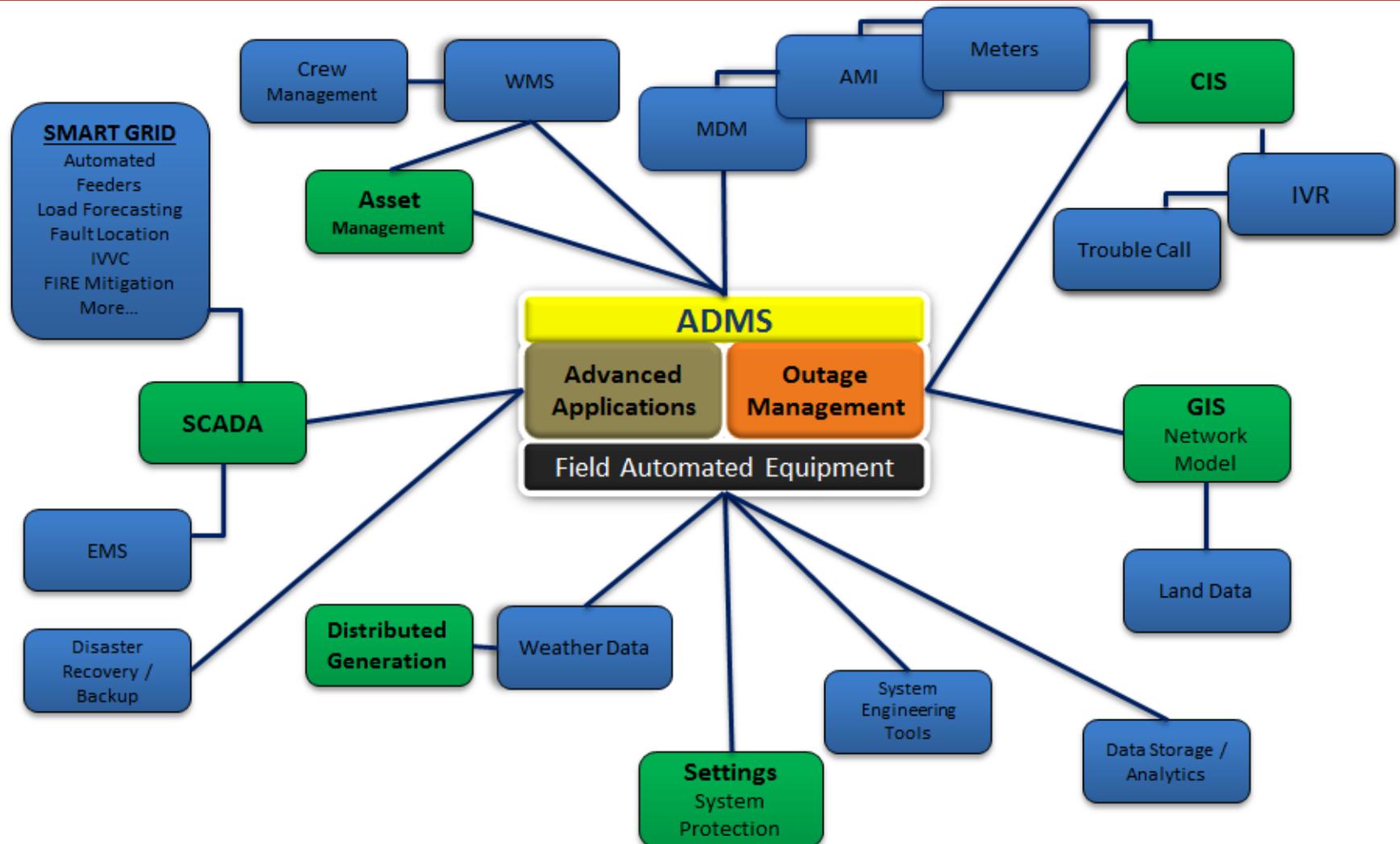
October 23, 2017

Advanced Distribution Management

- The simplified version of some of the pieces making up an ADMS.



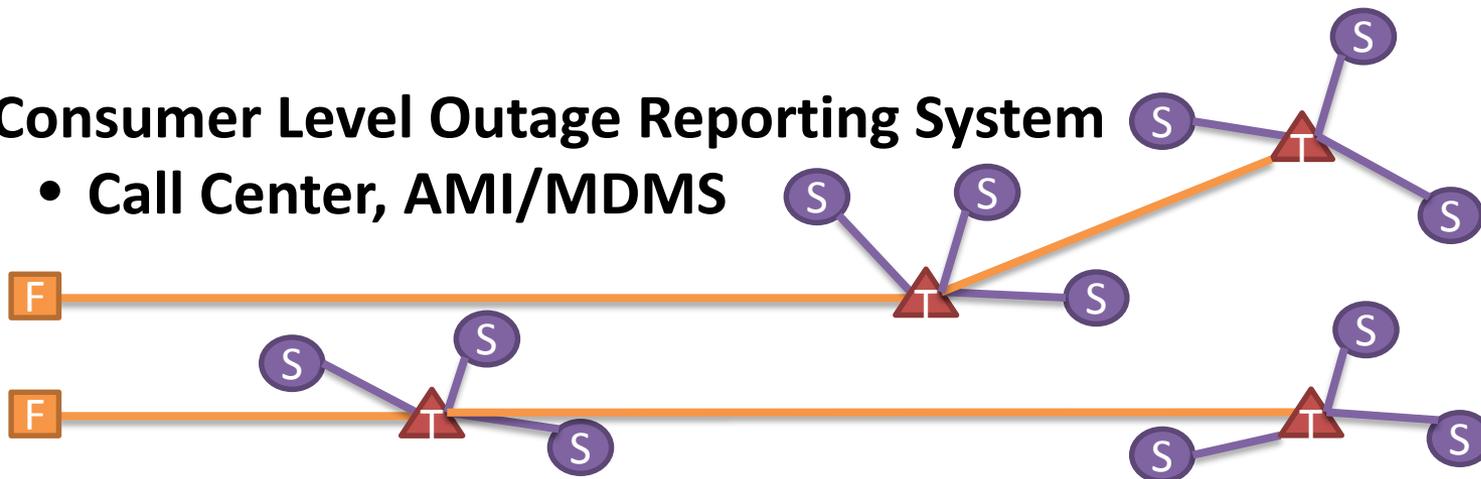
Integrating All the Data



Common Data Phased Approaches

Outage Management Phase

- Network Topology
 - Simplified Connectivity
- Feeder Level SCADA
 - Open, Close and Reclose Activities
- Consumer Level Outage Reporting System
 - Call Center, AMI/MDMS



Common Data Phased Approaches

Advanced Application Phase

- **Equipment Nameplate Data**
 - **Transformers, Regulators, Capacitors, Lines and Cables**
- **Equipment Settings**
 - **Fuse Curves, Reclosing, Coordination**
 - **Reverse Coordination**
- **Generation and Loads**
 - **DER, Peak Snapshots, Usage Curves, Weather integration**

Common Data Phased Approaches

Automation Phase

- **Field Equipment (Outside the Substation Fence)**
 - Reclosers, Automatic Transfer Switch
- **Additional SCADA Points**
 - Communicating Fault Indicators, Data Acquisition for Improved State Estimation
- **Change Management**
 - Operational Procedures and Safety

No Real “Wrong” Way

Arizona Public Service

- **Outage Management, Advanced Apps, Automation**

Xcel

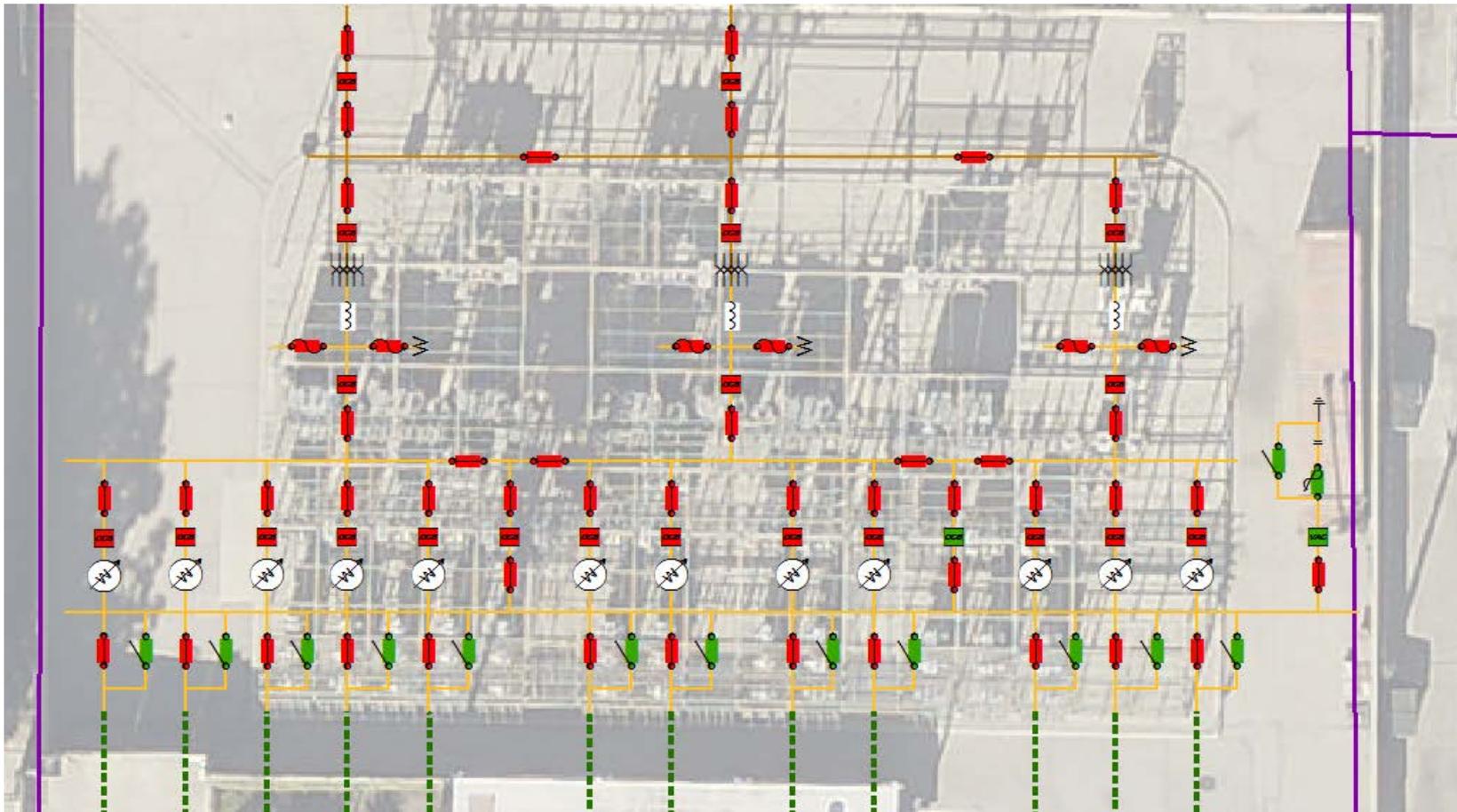
- **Advanced Apps, Outage Management, Automation**

Duquesne

- **Automation, Outage Management, Advanced Apps**

Endless Possibilities

Let the business drive the requirements.



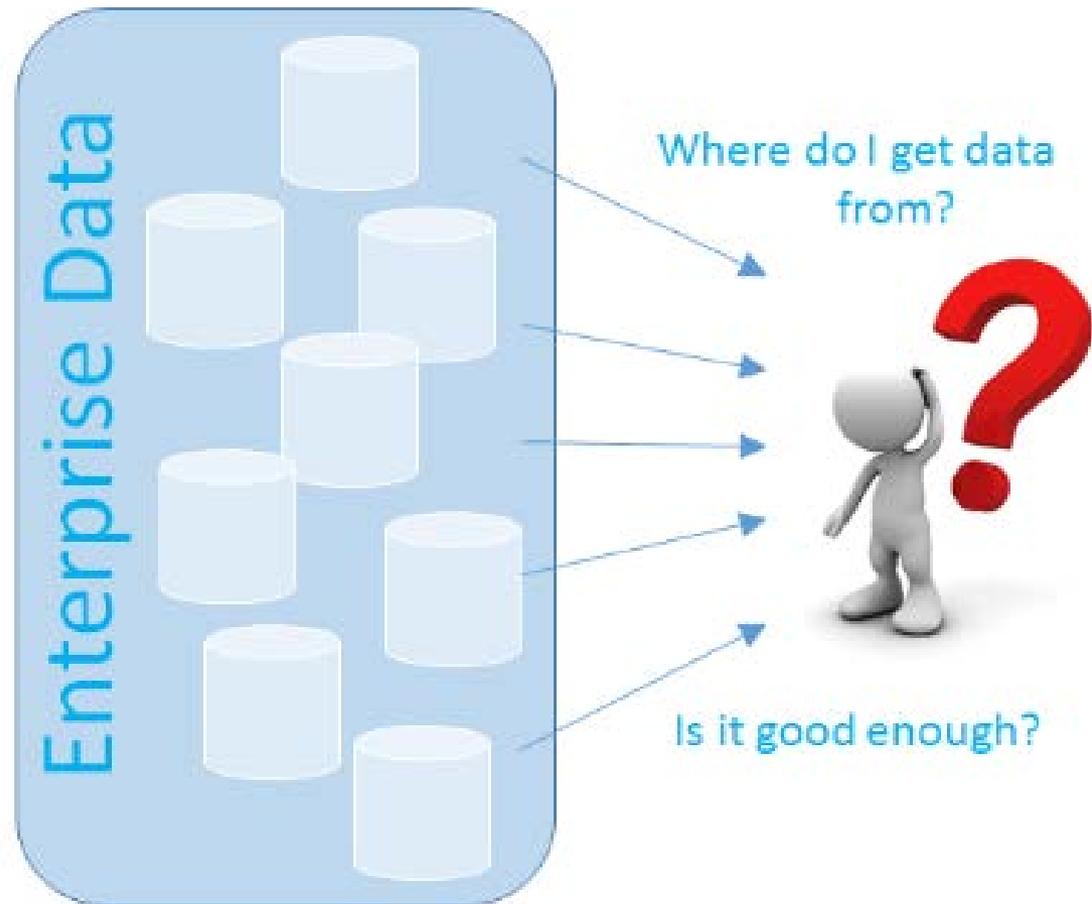
Don't Do Too Much At Once

Too many moving parts!



Getting into the weeds

Methods and Findings of mining data from sources of record and applying to an ADMS.



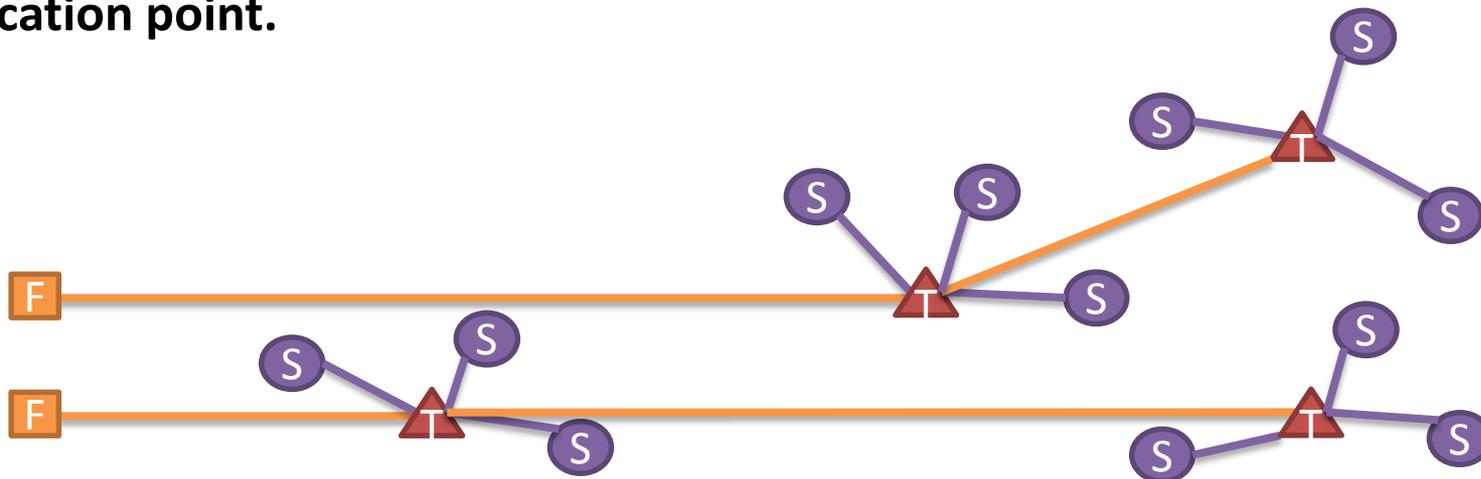
Network Topology

Methods

Data is commonly extracted from a Geographic Information System (GIS) and will need to be stitched together with substation internals. Methods are either to draw the substation pieces into the DMS or connect it from another system via a common demarcation point.

Findings

Many utilities have systems of record with overlapping data. Often a demarcation point is placed at or near the substation fence to stitch the substation internal topology with the GIS.



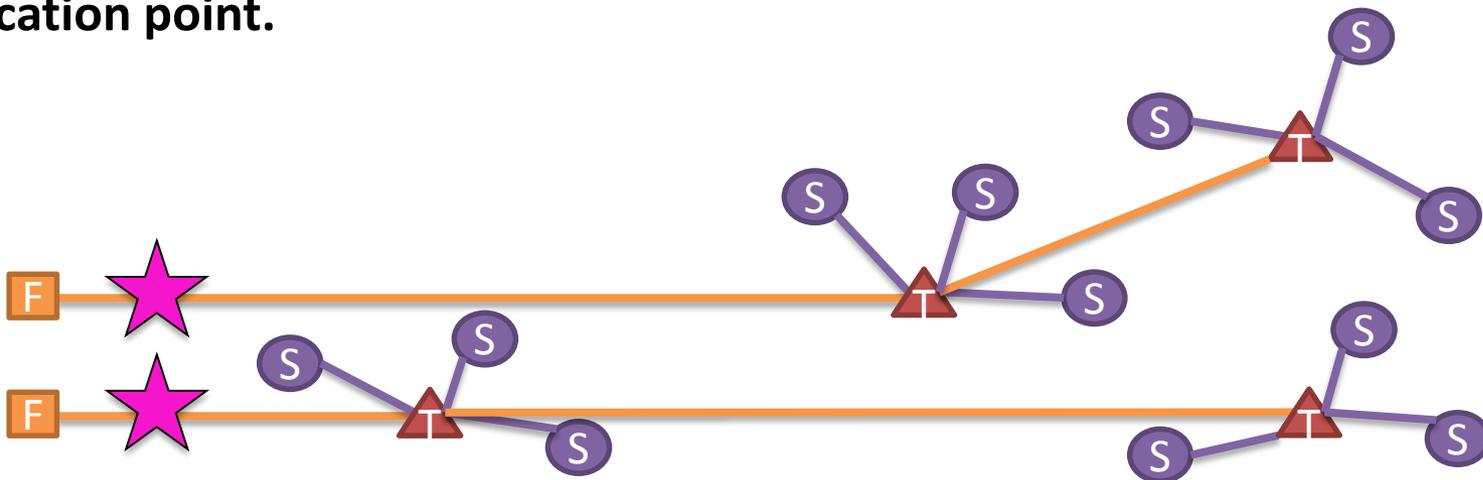
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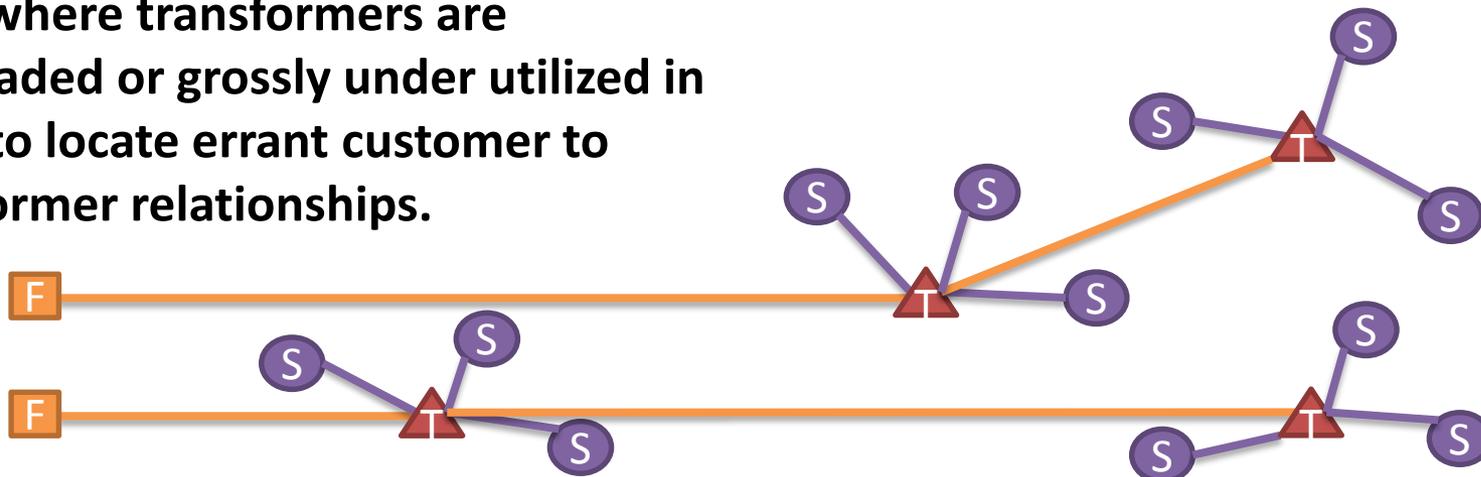
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Customer Information

Methods

Data is commonly held within a customer information system for meter to transformer relationships. True secondary connectivity is a great method to ascertain that loads are connected to the proper transformer. Allow the analytics of the system to show where transformers are overloaded or grossly under utilized in order to locate errant customer to transformer relationships.



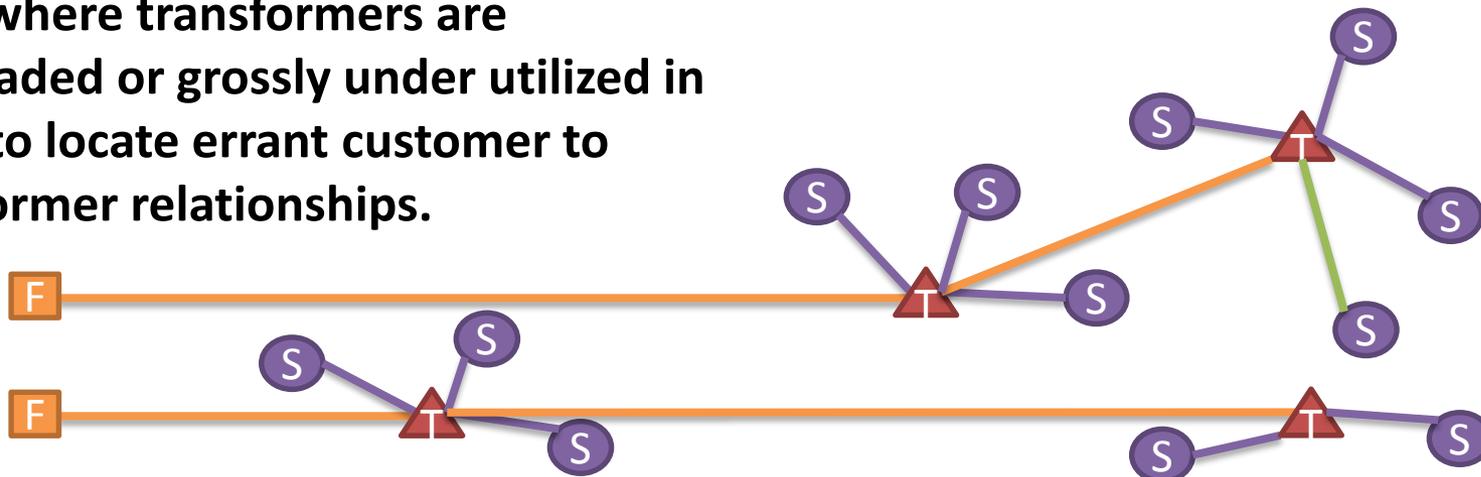
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Apartment and condo complexes were exposed by load profiling because they contained multiple transformers with the same physical address. Many of which never experienced a localized outage to ever question the data.

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Findings

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Asset Management

Methods

Where an enterprise asset management is not available, create equipment catalog tables to keep the mapping system from getting overly cluttered and difficult to maintain.

Findings

When an equipment category did not exceed 100 pieces, it was not beneficial to create a part numbering system to allow for a one to many relationship. In this case the catalog table had an entry for each asset ID. There were also occasions where a single piece of equipment could have dual sets of catalog data dependent on how it was installed.

Asset Management

Methods

Where an enterprise asset management is not available, create equipment catalog tables to keep the mapping system from getting overly cluttered and difficult to maintain.

Look out for

- **Dual Voltage Transformers**
- **Duplex Transformers**
- **Manual Tap Settings**
- **Combination Banks**

Findings

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SCADA Points

Methods

SCADA IDs will need to be assigned to features in your network model in order to associate the signals to the DMS graphical user interface.

Findings

Sometimes there a more than one SCADA ID that need to be assigned to a particular feature in your network model. Consider composite or container features to accommodate multiple signals like Temp, Door Open, Switch position of multiple switches in the same cabinet.

Distributed Generation

Methods

Determine how metering and modeling will be attributed for a net metering (single meter) or production metering (two meters).

Determine if switch data is needed in the network model to prevent distributed generation backfeeds from occurring during a feeder outage.

Obtain accurate sizing and date of installs to calculate the degradation of the photovoltaic system over time.

Findings

Timing of external weather data predictions for state estimation was more daunting than expected.

A complete redraw of the DERs were required in the GIS to apply protective switchgear and inverter information. Install dates had to be requested from cities and counties through local building permits to determine degradation of the individual installations.

Settings

Methods

Determine what is actual settings data as opposed to asset data (catalog info) or location data (network and map attributes).

Provide a source matrix for all users to understand where the single source of truth resides. Reduce duplicate data entry where possible.

Examine the process flow to provide near real time information on changes to settings.

Findings

Settings were held in many disparate databases and spreadsheets.

Attacking this early may allow a consolidation project to precede the ADMS implementation.

The data stores for these were generally dependent on the brand of device.

Conclusions

- While the data could be the most daunting task in implementing an ADMS with the functionality that you are expecting, automated methods and default values can obtain a level of quality that will work while trying to meet your goals.

Conclusions

- You may think your data is ready, but until it is tested by another application you really will not know. Do not discard the quality of your data and expect it to be perfect prior to the ADMS software installation. Instead, embrace your first pass and allow time for the ADMS to find issues to fix singularly or globally in your systems of record.

Ideas?

