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From SCADA to ADMS: Strategic Approaches to ADMS Implementation

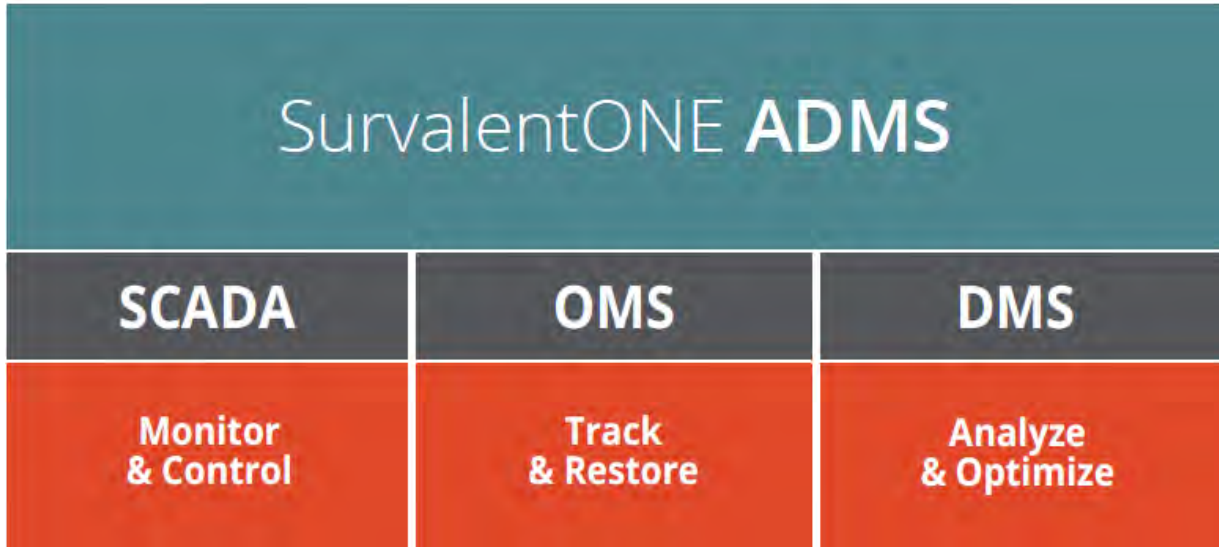
Oct 7th, 2025

ADMS Implementation

- Advanced Distribution Management System (ADMS) is pivotal for the future of utility management; however, it comes with its own set of challenges across practical, commercial and technical aspects
- What ADMS consists of and how to plan and prioritize the roll-out of the advanced applications
- What actionable steps can you take to prepare your organization for ADMS adoption
- The importance & benefits of a single unified ADMS

SurvalentONE ADMS Platform

- Fully integrated SCADA, OMS & DMS solutions delivers real-time operational intelligence & control
- Allows you to effectively operate, monitor, analyze, restore, and optimize critical network operations from a common user interface
- Single hardware platform simplifies IT/OT maintenance & security



SurvalentONE SCADA

SurvalentONE SCADA

- Real-time supervisory control & data acquisition for greater reliability and improved performance
- Increased operational efficiency & cost savings through remote communication to field devices
- Advanced data collection & situational awareness for faster, more informed decision-making

SurvalentONE SCADA – How to get there?

- **Existing electrical assets**
  - Circuit breakers and reclosers vs. fused switches
  - Load tap changers
  - Existing metering capabilities
- **Relays** – Microprocessor relays with communication capabilities
  - Often many utilities are in some level of upgrading protective devices to microprocessor devices
  - Replacing relays tends to prove more cost effective than trying to add remote metering and control capabilities via other methods
  - The key is to enable remote metering, status, and controls

SurvalentONE SCADA – How to get there?

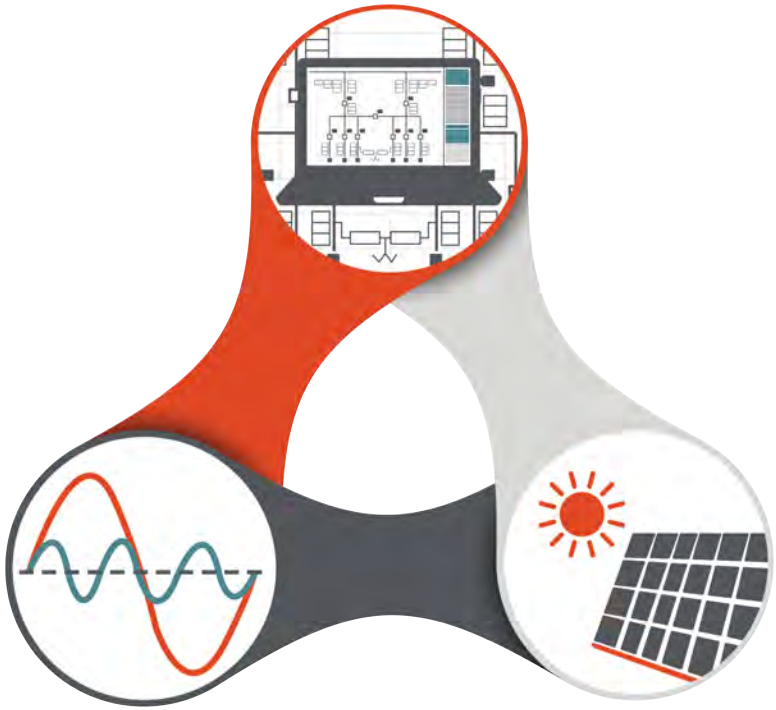
- **Communication Architecture** (radio, fiber, cellular, AMI network)
  - Radio. Pro: inexpensive for long distance. Con: can be intermittent.
  - Fiber. Pro: reliable, high speed. Con: expensive, especially for long distance.
  - Cellular. Pro: Leverage existing public infrastructure. Con: recurring cost.
- **Planning for the Shift in Operational Execution**
  - Will control room/center for SCADA have more authority than previously considered
  - Who will execute opening and closing of devices – field operations personnel or SCADA system operator
  - Who is responsible for switching orders

SurvalentONE Distribution Management System (DMS)

SurvalentONE DMS Overview

Distribution Management System

- Applications designed to analyze & optimize an entire network
- Use real-time data
- Improve network efficiency & reliability
  - Minimize outage downtime
  - Maintain acceptable voltage levels
- Assist control room operators & field crew in decision making



SurvalentONE DMS Overview

Applications available in the following categories:

- **Demand Response:**
  - Effectively manage loads during peak demand to ensure power quality, prevent overloads, and maintain grid stability. Applications include DVR, VVO, LC/RLS.
- **Distribution Automation**
  - Designed to enhance network reliability by automatically reconfiguring to maintain electricity flow to as many customers as possible. Applications include PFC, FLISR/LOV, PSM, DCA.
- **Analysis & Forecasting**
  - Provide real-time visibility into the network, empowering informed decision-making, improving DER management, and monitoring grid's power flow. Applications include Load Forecasting, DPF/DSE, FLA.

SurvalentONE DMS Application Deployment

PHASE 1:
No network model or topology/connectivity required

- Load Management
  - Power Factor Control
  - Dynamic Voltage Regulation (DVR)
  - Load Curtailment
  - Rotational Load Shedding
- Load/Generation Forecasting (Themis)

PHASE 2:
Topology/Connectivity required

- Fault Location, Isolation and Service Restoration (FLISR) & Loss of Voltage (LOV)
- Protection Settings Manager (PSM)
- Distribution Contingency Analysis
- Schematic Generator

PHASE 3:
Network model & topology/connectivity required

- Distribution Power Flow (DPF)/Distribution State Estimation (DSE)
  - FLISR with DPF
  - Short-circuit analysis
- Fault Location Analysis
- Volt/VAR Optimization (VVO)
- Optimal Feeder Reconfiguration (OFR)

Dynamic Voltage Regulation (DVR)

Phase 1

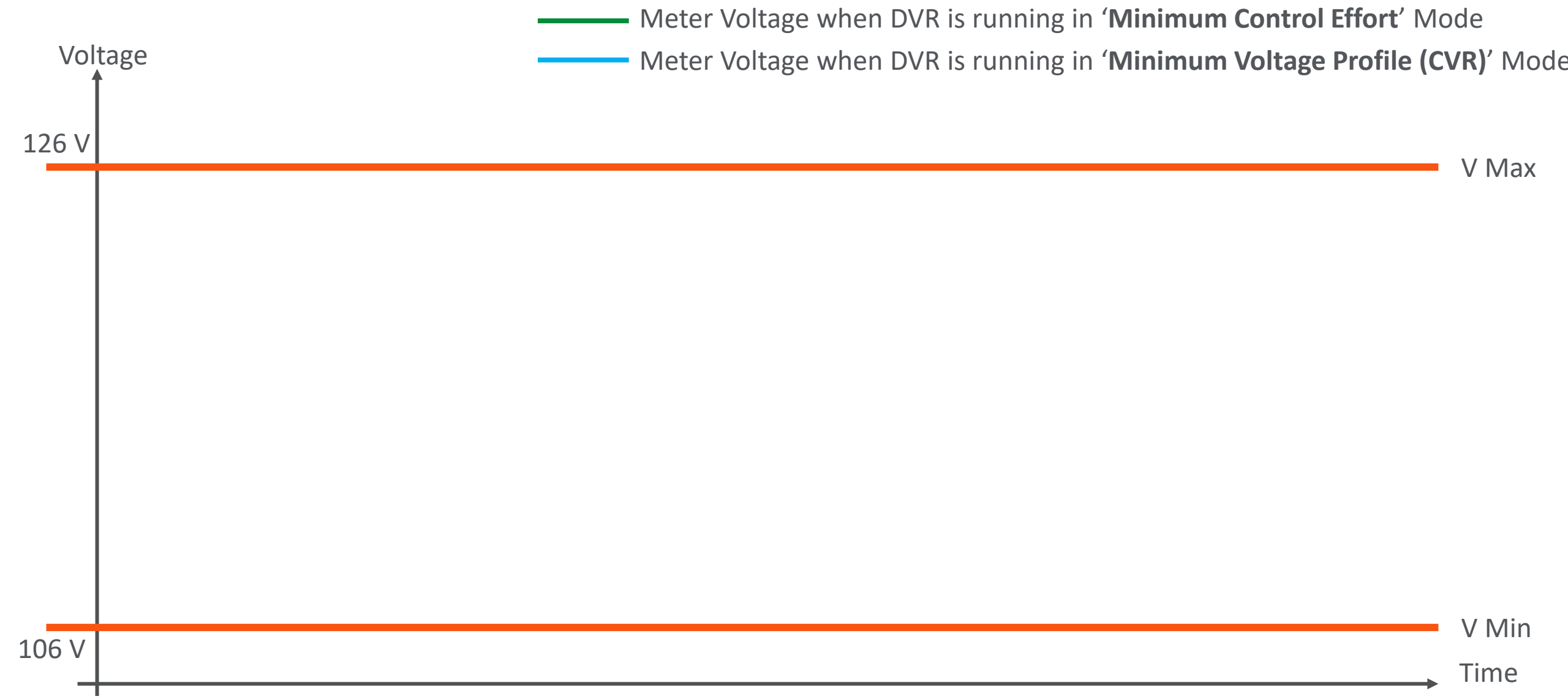
- Automatically maintains end-of-line voltages at a pre-set level
- Ensures proper grid operation & conforms to government/association guidelines
- Can be set for minimal control effort or minimum voltage profile (peak shaving)
- Requires feedback from end of line devices (e.g., AMI meters)

Benefits

- Achieve conventional conservation voltage reduction (CVR)
- Reduce peak demand
- Manage optimal feeder voltage limits

DVR Operations

Phase 1



Load Curtailment (LC) / Rotational Load Shedding (RLS)

Phase 1

Load Curtailment (LC)

- Targeted Demand Management by curtailing behind-the-meter loads (e.g. ACUs, Water Heaters, Heat Pumps, Pool Pumps, etc.)
- Controlled by LCRs (Load Control Receivers), AMI, other devices.
- Control actions can be via command sequence, calculated points or external interfaces (*mechanism that triggers load curtailment events*)

Rotational Load Shedding (RLS)

- Shed loads across predefined network sections for large-scale demand management, by creating rolling outages.
- User-defined parameters (target, priorities, schedule, duration, intervals) with various operating modes and algorithms.

DMS Phase 1 – How to get there?

Phase 1

- **Existing Electrical Assets** – Are the proper devices available to use for the DMS applications?(radio, fiber, cellular, AMI network)
  - LTCs/Voltage Regulators for DVR
  - Control of devices at the proper granularity for RLS/LC
- **Distribution Asset Technology**
  - What is the distribution technology level? Are controls/intelligent devices only at substation or also in field / distribution level?

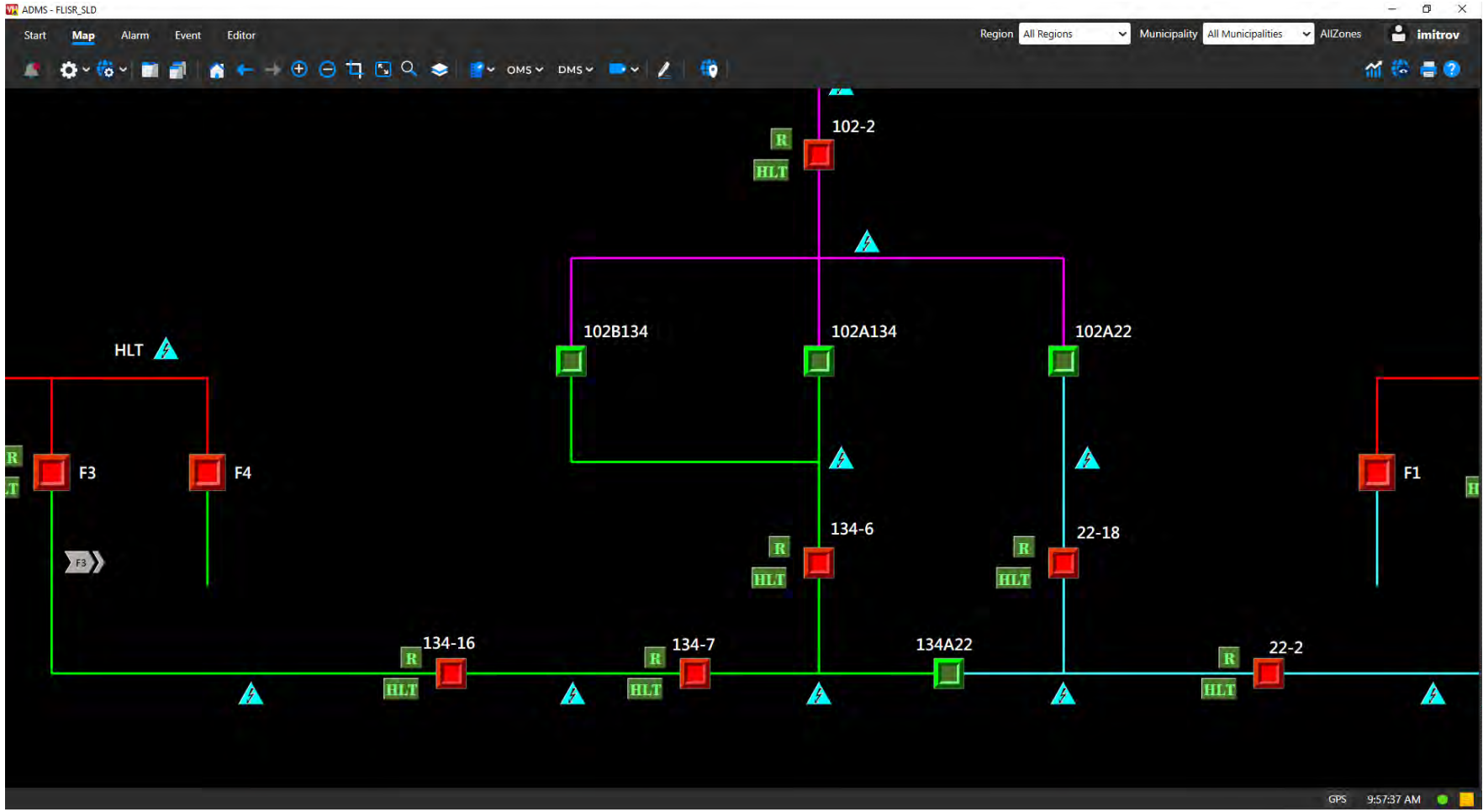
DMS Phase 1 – How to get there?

Phase 1

- **Relaying and Controls** - Assets such as breakers, voltage regulators and LTCs must be capable of remote control
- **Distribution Metering** - Integrate end of line metering data into SCADA (e.g. AMI meters or other devices)
- **Communication** - Requires reliable, high-speed communications for timely response
- **Operational Execution** – Field devices will now start to be controlled with no human interaction

Building Blocks: Phase 1 to Phase 2

- **Connectivity Model**
- **Network Topology Processor** required
- Where to get the data?
  - GIS
  - Drawn directly in SmartVU



SurvalentONE FLISR & LOV

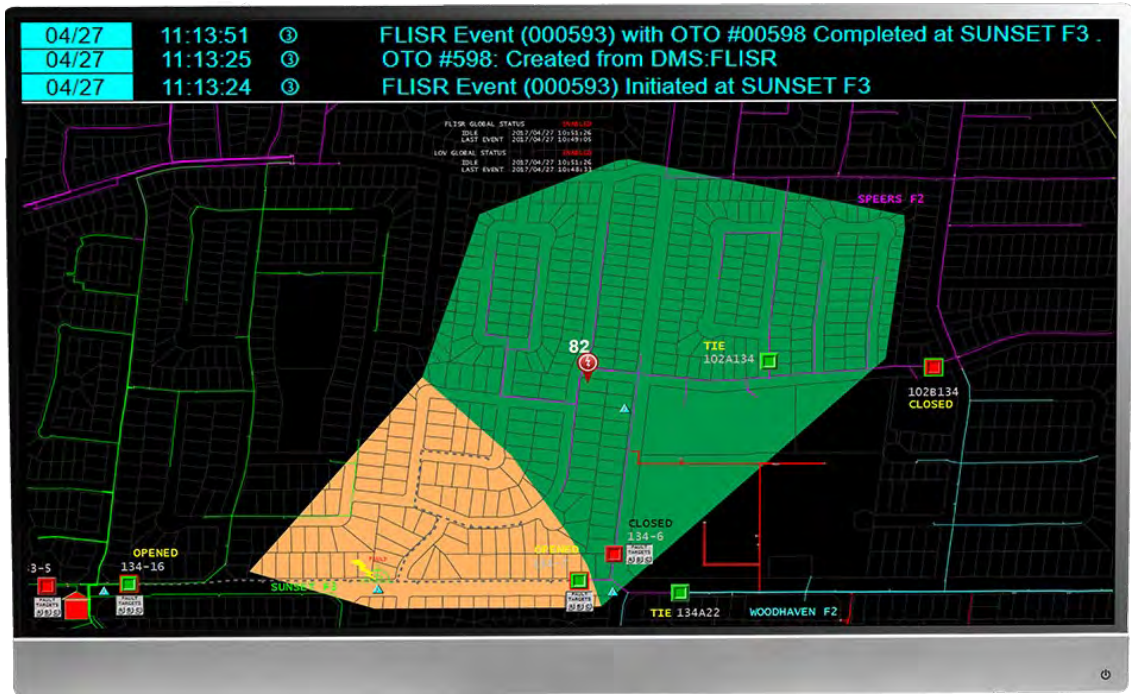
Phase 2

Fault location, Isolation & Service Restoration (FLISR)

- Automatically reroutes power to restore as many customers as quickly as possible after a fault

Loss of Voltage (LOV)

- Monitors the network for sudden voltage drops & attempts to isolate the cause & reroute power to as many customers affected as possible



FLISR: Impact on Customers

Phase 2

Fault Occurs

Partial Restoration at utility control room

Less than 5 mins

Travel Time & Locating the Fault

40 - 60 mins

Repair Time

1 - 4 hours

Return to Normal State

FLISR / LOV with DCA & PSM

Phase 2

PRE – FAULT | DURING FAULT | POST – FAULT

DCA	FLISR / LOV	PSM
Distribution Contingency Analysis	Fault Location, Isolation, and Service Restoration; Loss of Voltage	Protection Settings Manager
▪ Periodically monitors if designated key locations (hospitals, industrial parks, etc.) can fully recover from a Fault or Loss of Voltage	▪ FLISR/LOV – Isolates the fault/loss of voltage, and reroutes power to restore as many customers as possible.	▪ Continuously monitors the network in the background at a fixed interval and maintains appropriate relay settings

END – TO – END SOLUTION

DMS Phase 2 – How to get there?

Phase 2

- **Existing Electrical Assets** – Distribution asset technology advancements become critical
  - Strategically upgrade fuses, cutouts, switches, breakers, and controls
  - Recloser with relay vs gang operated switch?

- **Communication Expansion** – Communication to field assets is required

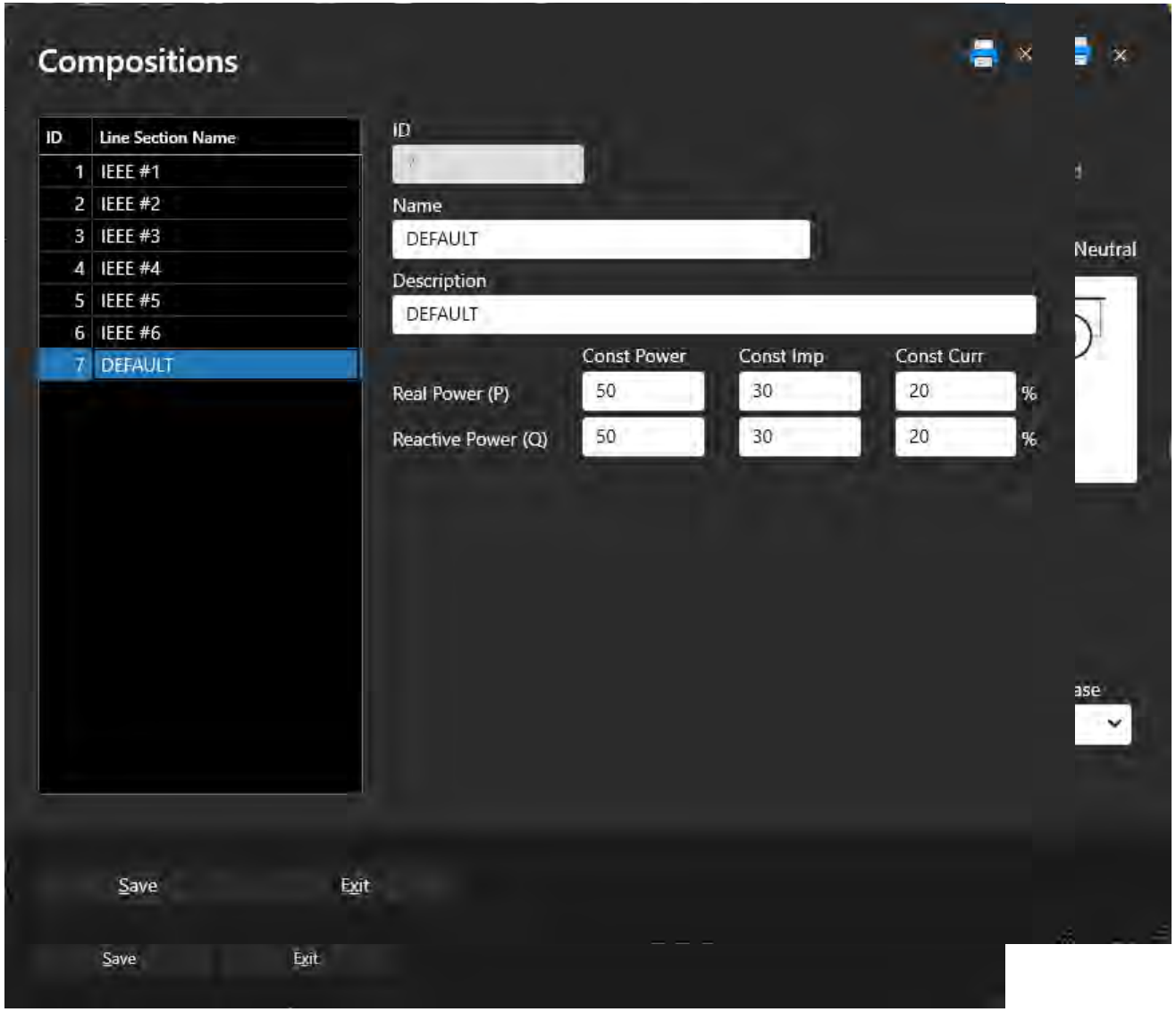
DMS Phase 2 – How to get there?

Phase 2

- **Distribution Model – Topology Is Required**
  - One-line/manual - typically best used for small deployments or if GIS does not exist or needs many updates
  - GIS Import – Allows the GIS to be imported and provides the information for the connectivity model
- **Integration of Non-telemetered Devices**
  - Develop procedures to ensure the status (open/close) of remaining manual devices is updated real time in ADMS
- **Operational Execution** – Communication between operators and field crew becomes even more critical

Building Blocks: Phase 2 to Phase 3

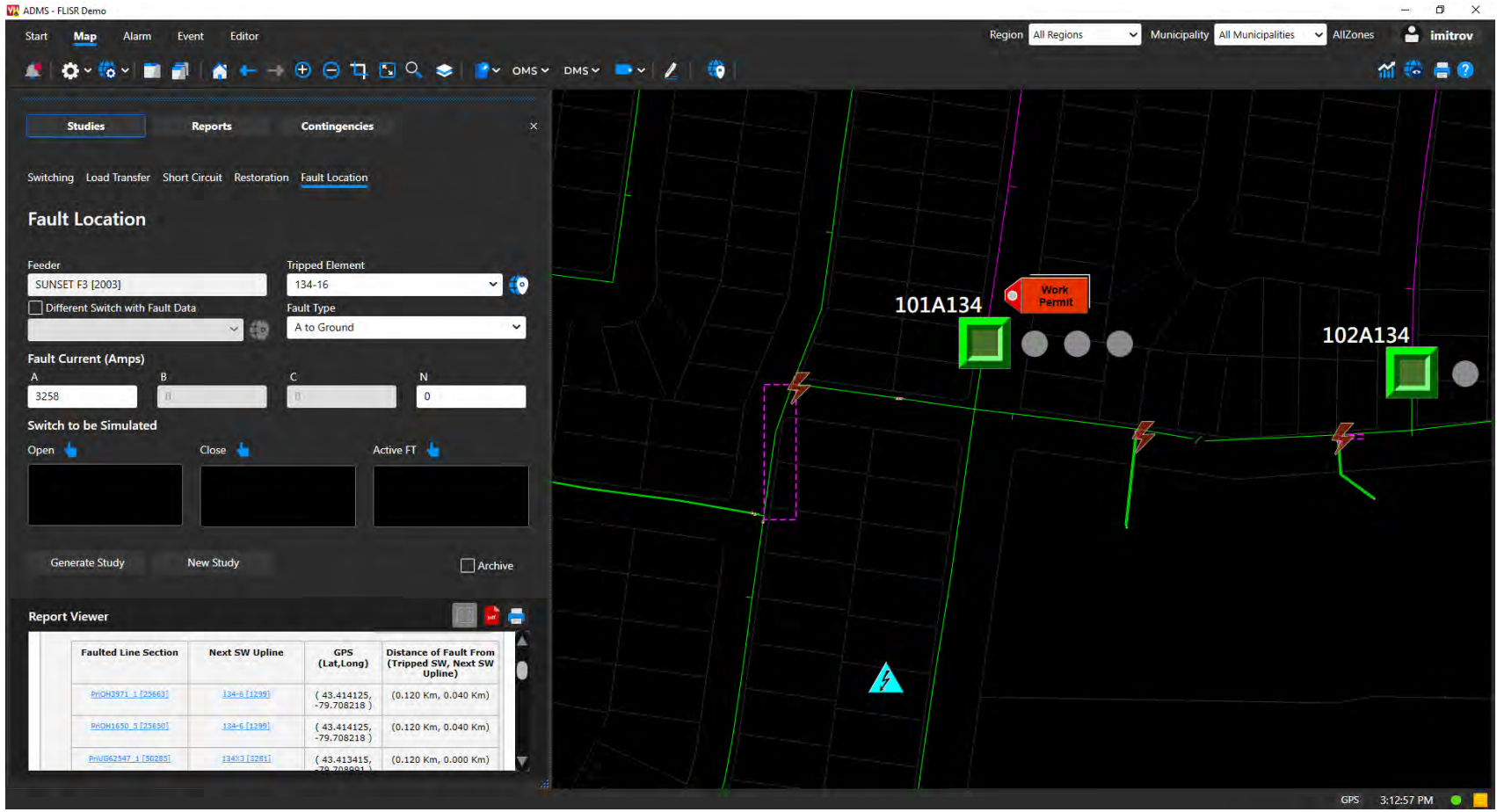
- Electrical **Network Model** entered/imported into ADMS.
- Equivalent amount of data as one of your modeling tools (Windmill, CYME, CAPE, ETAP, etc.), and more.



Fault Location Analysis (FLA)

Phase 3

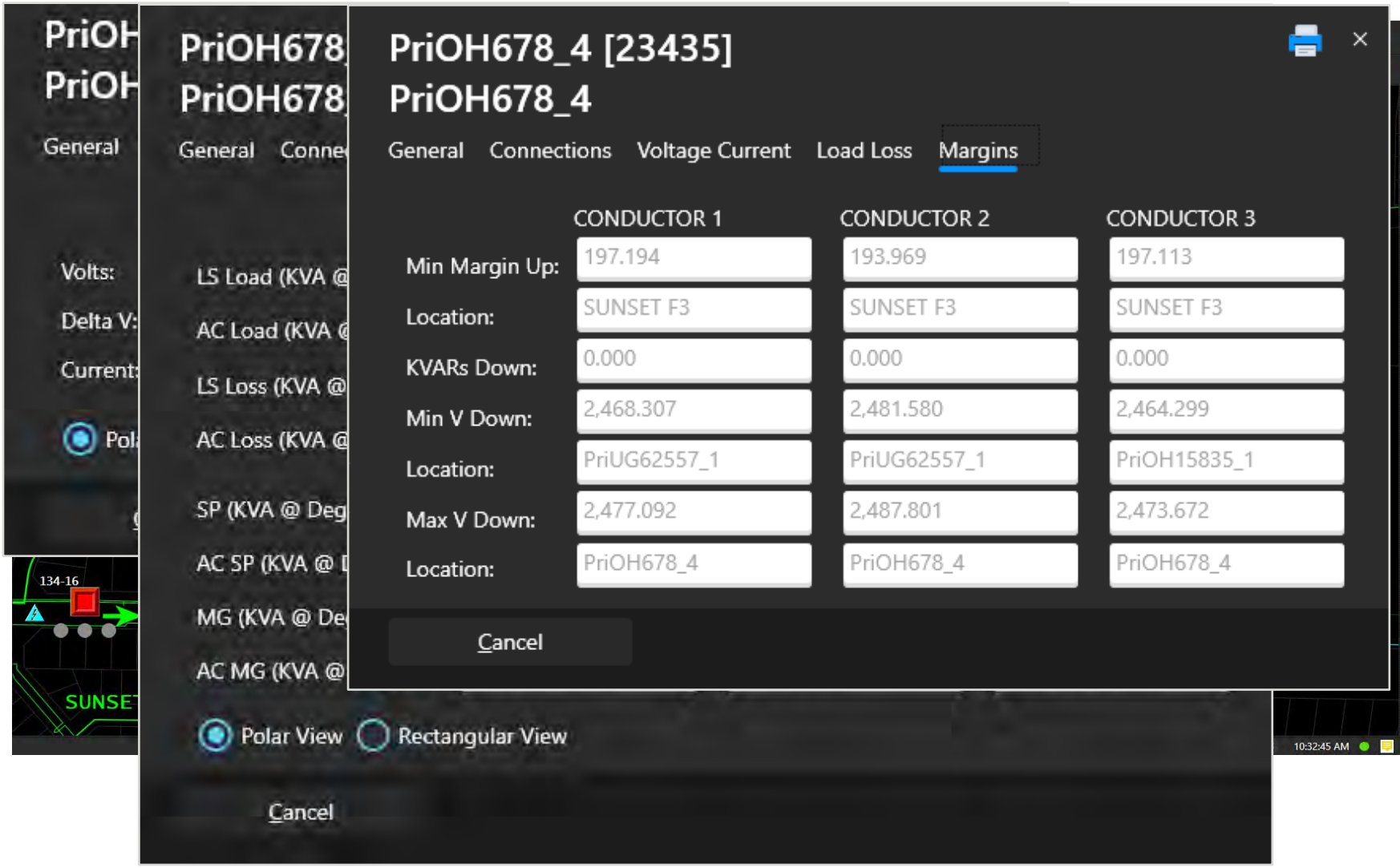
- Fault Location Analysis helps operators quickly locate faults based on impedance models and fault data (fault current)
- Operators can run FLA in the as-operated network model, or adjust the topology to how it was at the time of the fault



Distribution Power Flow/State Estimation (DPF/DSE)

Phase 3

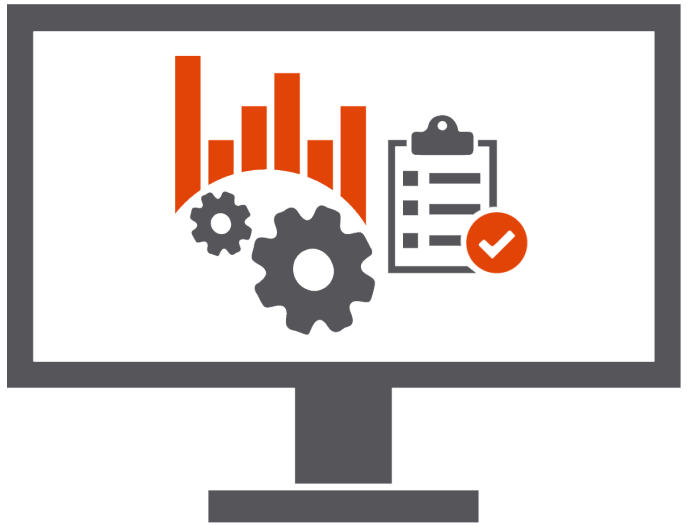
- **Periodically, as well as after significant changes in the network, DPF:**
  - Redistributes the feeder load data so that the total matches the substation data in the ADMS
  - Updates the feeder voltage/loss profiles, min/max margin and min/max volts data



Distribution State Estimation (DSE)

Phase 3

- Extends the functionality of DPF:
  - Uses SCADA measurements outside of substations
  - Performs consistency checks, eliminating time skews on all measurements
  - Incorporates micro-grids & distributed generation into the power flow calculation



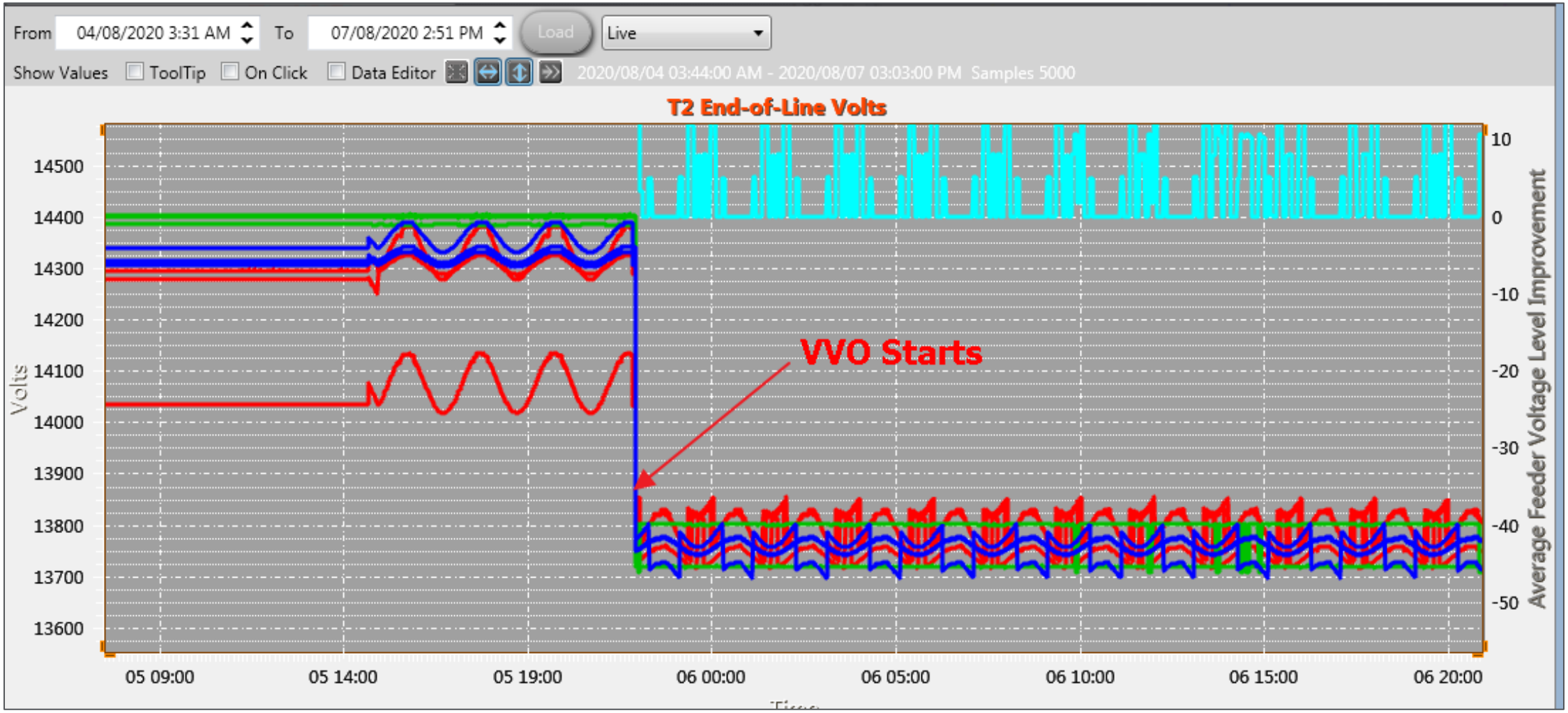
Volt/VAR Optimization (VVO)

Phase 3

- Coordinates control of reactive power & voltage
- Improves energy efficiency in the distribution system
- Reduces both energy loss & peak demand
- **VVO application aims to either:**
  - **Minimize loss**
  - **Conserve energy**
  - **Reduce voltage**
- Operate in automatic or semi-automatic mode

VVO: Reduce Voltage Example

Phase 3



DMS Phase 3 – How to get there?

Phase 3

- **Asset Data**
  - Conductor-type data and catalogs
  - Information on the loading limits for cables
  - KVA ratings of distribution transformers

- **Load Data**
  - Load Profiles and Load Compositions for different types of customers

DMS Phase 3 – How to get there?

Phase 3

- **Methods for Data Integration**
  - GIS Import – Strongly recommended and preferred
  - Manual Data Entry

- **Real-Time Data**
  - Three phase power measurements on the Feeder Main and/or downline telemetered devices
  - Any combination of the following is required:
    - I, V, PF
    - I, V, kW
    - kW, kVAR, V

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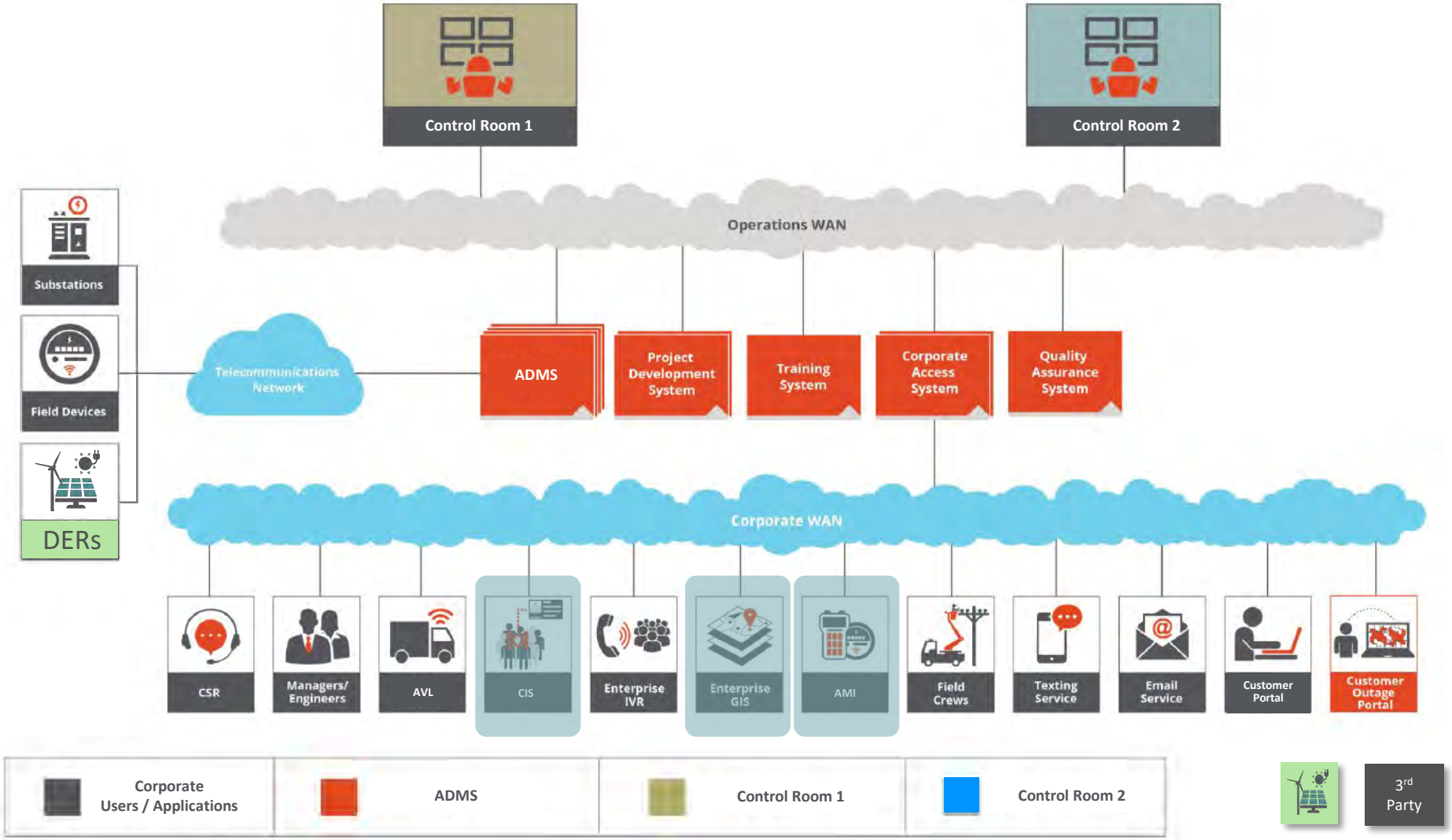
Outage Management System (OMS)

SurvalentONE OMS Overview

- A comprehensive solution that allows utilities to reduce the scale & duration of outages through efficient tracking and management providing:
  - Predictive outage analysis
  - Processes for rapid damage assessment
  - Reporting capabilities
  - Enhanced customer communications capabilities
  - Guide dispatchers & field crews for restoration efforts

System Overview



SurvalentONE OMS: User Applications

SmartVU

- Control Room

Call Handler

- Customer Services Representatives

Dashboard

- Management, Engineering, Communications…

Outage Portal

- Customers

Polaris

- Field Crew

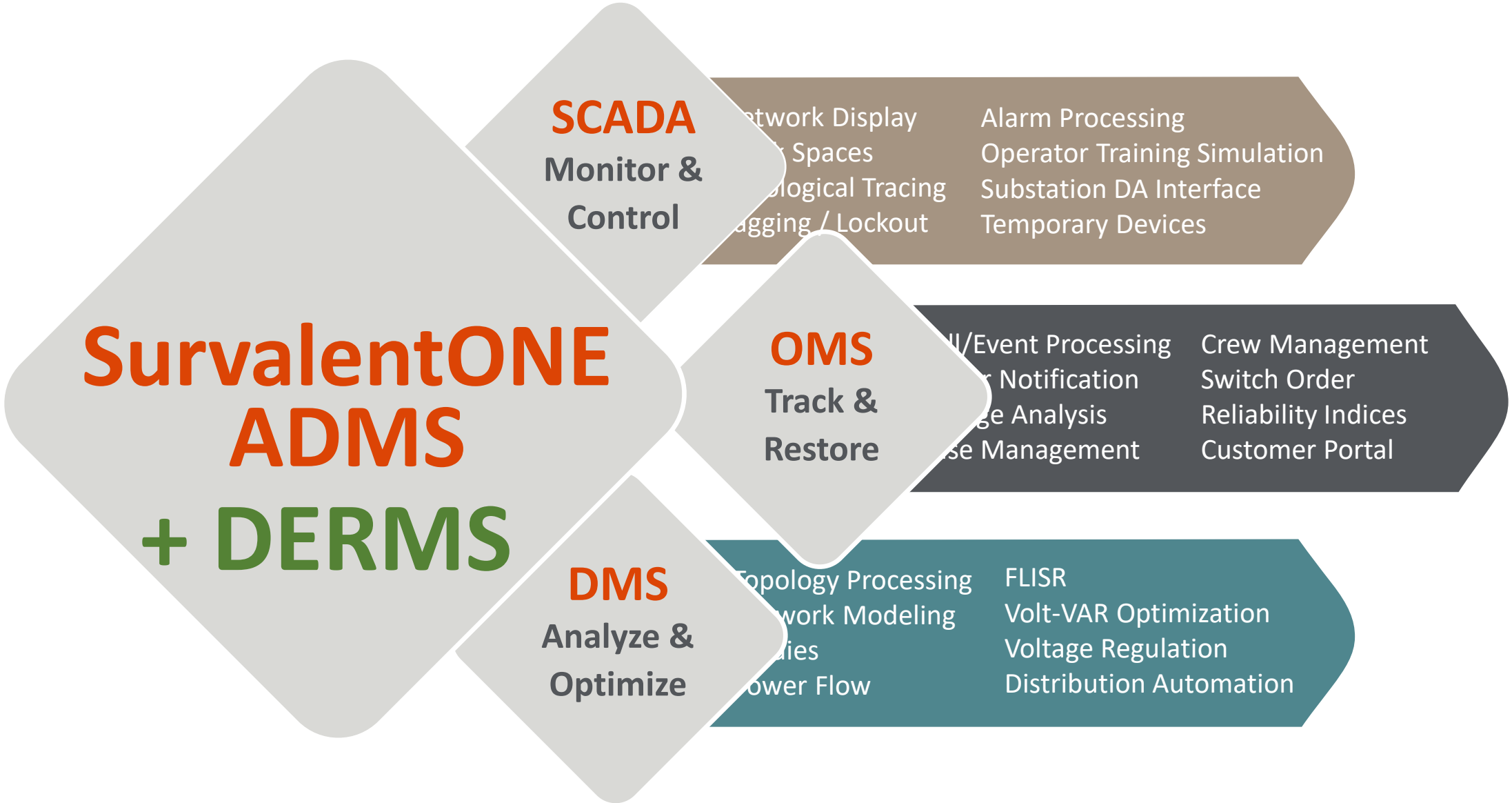
Support for ADMS Deployment and Testing

Project Development System (PDS)	Quality Assurance System (QAS)	Operator Training Simulator (OTS)	Operational Analysis Env. (OAE)
Allows users to: ▪ Edit in an offline environment ▪ Publish changes to production once the user is ready	Allows users to: ▪ Test software updates/patches ▪ Test configuration changes ▪ Perform hardware/software tests	Allows users to: ▪ Train on the ADMS in an offline environment ▪ Test or validate scenarios (in testing phase)	Allows users to: ▪ investigate future hypothetical states of the network ▪ Offline power system simulator available to see how the network would react

▪ Project-based – multiple concurrent projects can be active at any time
▪ Multiple users can edit concurrently as well
▪ Option to test changes in the offline environment before publishing to production
	▪ Replicate your production environment in a test setting	▪ Take a snapshot of the production system
		▪ Save multiple snapshots of DB into separate studies
		▪ Global command sequence manager available for all studies
		▪ Validate switch orders in OTS, then import into the production system
			▪ Available pool of VMs, allows multiple users to run separate studies at once
			▪ Can be used to validate Switch Orders
			▪ Two modes available:
			  ▪ Real-time
			  ▪ What-if
			▪ Offline power system simulator available to see how the network would react

** Data forwarding license can be used with any of these four servers to update the servers with real-time data*

ADMS Platform

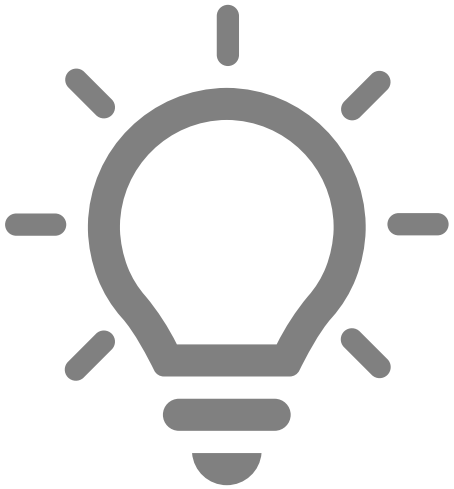


Why should You integrate SCADA, DMS and OMS (and DERMS?) under a Unified ADMS?

Unified ADMS Benefits

Benefits:

- Unified Operational View of the Grid
- Consolidated Interface for all OT Applications
- Centralized Management of Tags, Switching Procedures, and Field Work (e.g. temporary device, new installations)



Why is it important:

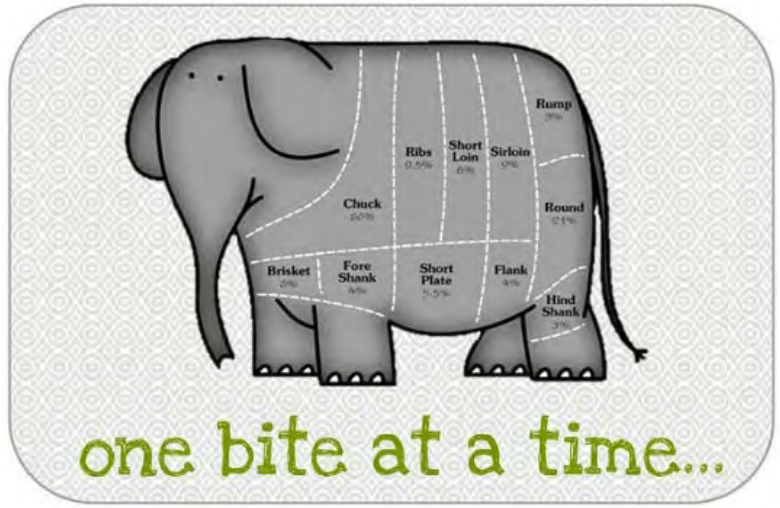
- Enhance situational awareness and operational efficiency, boost control room productivity, and improve field crew safety.

Who is ready to go?

It Doesn't Have To Be

How do you eat an Elephant?

- **Planning is the key**
  - Key goals and objectives
  - Evaluate goals versus available budgets and timelines
- **Take on the deployment one piece at a time**
  - Begin with the end in mind
  - Deployment may take some time, but executing per the plan will get you there



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Questions?

Thank You