EPRI DATA ANALYTICS CASE

Visualization of Distribution Network Voltage Excursions

The Data Challenge

Electric utilities are typically mandated by regulations to maintain a delivery voltage to a premises within a prescribed tolerance, sometimes referred to as a *voltage tolerance boundary*. The monitoring of voltage excursions from the prescribed tolerance is an important operational imperative for the utilities. Because each premises may see a different service voltage as a function of numerous variables on the distribution network, the utility has a challenging time visualizing individual voltage excursion to be able to make the needed judgments on a cause and to then make the required adjustments to bring the system back into compliance.

Solution Overview

By aggregating data sets from numerous sources, such as the advanced metering infrastructure (AMI) meter network, geospatial visualization is leveraged by a distribution operator or engineer to aid in identifying voltage excursions as they are experienced by the customer and distribution assets, such as transformers and the circuit itself.

Potential Methods for Solving the Problem

Using aggregated data from the AMI meter network along with other distributed intelligent device data from the distribution system, a graphical interface is developed, providing geospatial voltage excursion alarms based on operator thresholds. The operator or engineer may also query any node at any time to aid in troubleshooting a potential cause. In addition, the operator may be presented a potential source of the excursion to allow an expeditious correction. Performance metrics for each node may also be presented to the operator to allow for a deeper understanding of the condition. These metrics may include historical data for each node.

Available Data Sets

The data sets highlighted in the following figure are available in the EPRI Data Repository to solve this data analytics case.
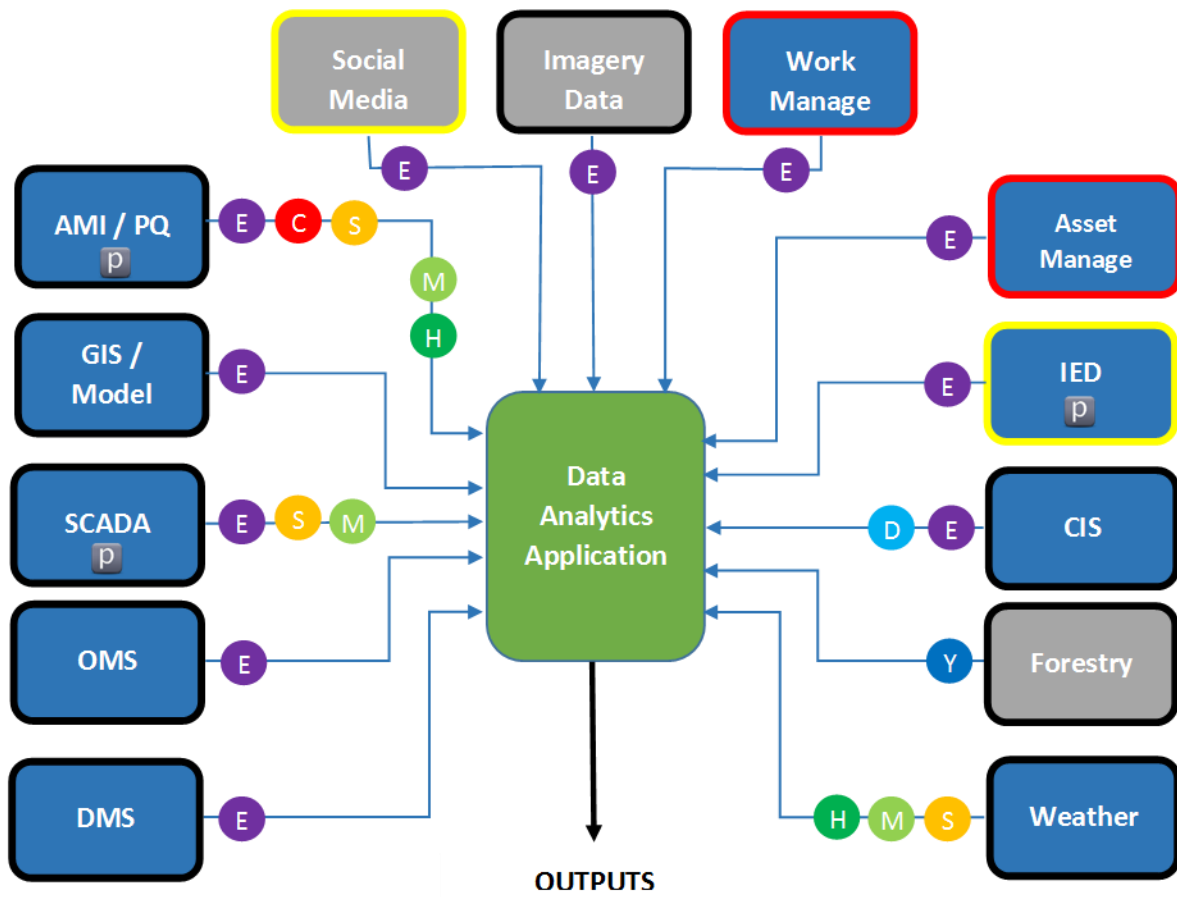
Classifications of Data:

- 🟦 Traditional Data Set
- ⬜ New Data Set
- ⬛ Structured Data
- 🟨 Un-structured Data
- 🟥 Format of Data Varies

Frequency of Measurement

- **C** Cycles
- **S** Seconds
- **M** Minutes
- **H** Hours
- **D** Days
- **Y** Months to Years
- **E** Event Driven

p Denotes a primary data set used to solve this data analytics case.