

EPRI DATA ANALYTICS CASE

Sequence of Outage Events Replay

The Data Challenge

In response to a fault or a series of faults on an electrical distribution circuit, tens if not hundreds of distribution devices report their status to system operators for the purpose of managing the outage. Timing information that can be used to chronicle the system response is present in the data, but it is generally not leveraged—resulting in missed opportunities to analyze the dynamic response of the distribution system.

Solution Overview

The high-level objective is to enable utilities to take advantage of data that are available, but underused, so that they can take proactive steps toward a more reliable distribution system. Analytical techniques and data visualization can be combined to generate a playback of the sequence of events related to a fault or a series of faults, assisting operators and engineers in the understanding of complex outages. Further, a replay of the sequence of events can reveal the performance of coordinated protection schemes and of individual devices so that opportunities to improve the dynamic response of the distribution circuit under fault conditions can be identified. A third benefit can be the reduction of time required to investigate the root cause of a widespread outage.

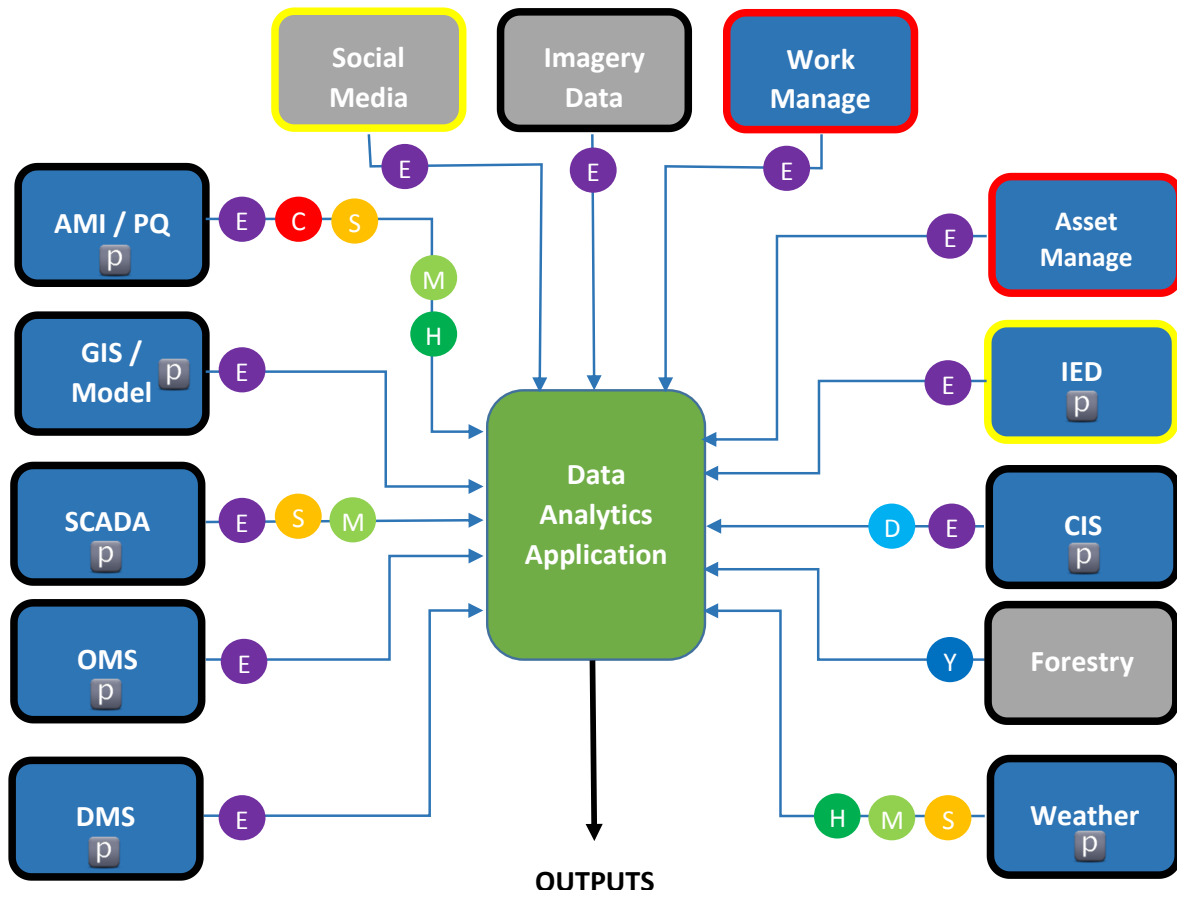
Potential Methods for Solving the Problem

The following are the most logical methods to explore first:

- By leveraging event-driven time stamps, a chronological order of events can be established.
- Waveforms, if available, can be used to validate the time stamps or fill in gaps where no event-driven timing information exists.
- Other inputs to situational awareness such as lightning data can corroborate inputs from other sources.

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

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

Frequency of Measurement

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