TETRA TECH

Harnessing AI Feature Recognition to Improve Grid Reliability and Restoration

A well-mapped secondary circuit network model is a crucial tool to help utilities power complex operations in an uncertain energy landscape. With greater awareness of how customers are connected to the distribution system, utilities can restore connections faster, reduce outage durations, and save on maintenance costs – and artificial intelligence (AI) can help.

Tetra Tech is ramping up reliability with a secondary circuit network model.

Mapping and Modeling with LiDAR, AI, and GIS

In the face of massive disruption, conventional mapping techniques — costly, time consuming, and prone to human error — are not enough. Modern utilities need comprehensive 3D maps of their distribution network to limit the need for manually patrolling millions of miles of power lines. Our AI feature recognition capabilities have helped identify vegetation encroachment and cable faults. Now, we may use it to map customer connections.

Capable of mapping assets from the substation to the meter and even the customer panel, LiDAR and geographic information systems (GIS) are cost effective, accurate, and efficient. They allow utilities to capture, store, analyze, and manage data on each individual component in their distribution network. LiDAR sensors use laser technology to produce 3D maps of the environment, while GIS technology enables the integration and analysis of spatial data.

Gone are the days of manual inspections and handwritten notes on damage assessment logs. Using images collected by fixed-wing remotely piloted aircraft or vehicles patrolling streets and structuring the data with AI, utilities can create more than just maps and detailed profiles of the terrain. By integrating advanced analytics and modeling techniques, utilities can develop an up-to-date and comprehensive model with locations of all secondary circuits and connected infrastructure.

Describing Assets, Predicting Events, and Optimizing Performance

Secondary circuit models enable proactive management. They provide a level of precision and detail that empowers decision-makers. In addition to the locations of circuits, the models pinpoint overhead single-phase and three-phase distribution transformers, distribution poles, and overhead distribution switches and metering equipment. They can contain information not only on location but also on condition and connectivity.

Combining the best data and human insight, utility leaders can streamline operations, reduce costs, plan for future growth, and respond more quickly and effectively to service interruptions and outages.

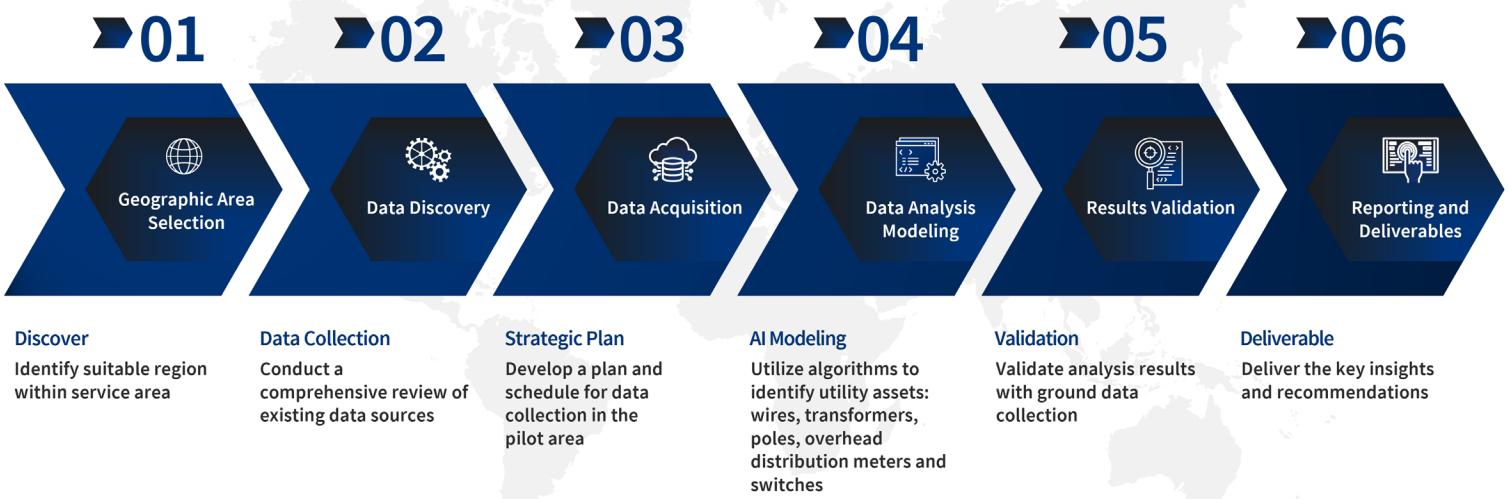
Risk managers can identify potential safety hazards, prioritize maintenance and repair activities, and reduce the risk of accidents and equipment failure. Grid operators can ensure that network improvements and additions, such as the adoption of distributed energy resources, are integrated smoothly and do not negatively impact network reliability.

Tetra Tech's Approach to Accurately Map Utility Infrastructure

Tetra Tech's utility management consultants, equipped with advanced analytical tools such as FusionMap (tetratech.com), can help you implement our six-stage process for developing a comprehensive secondary circuit model (**Figure 1**). We work with clients to produce digital models tailored to your utility's systems and processes, from inception and pilot design through data analysis and change management.

We are eager to hear how AI tools can enhance *your* grid operations.

Figure 1: Tetra Tech's six-stage process to create a utility circuit model



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