

Integrated Distribution Management Systems for Electric Grids

Optimized and reduced network loads save millions of dollars and over 100,000 MWh per year

Client: Energy expert providing digital solutions for high-reliability electricity-distribution management systems

Industry: Energy and Utilities

Project Type: A suite of applications designed specifically to optimize and future-proof distribution networks

Overview

1 Challenge:

Today's operating landscape for distribution grids is expected to evolve more in the next decade than in the whole of the previous century. This is due to massive pressure on distribution operators to adapt to the evolving energy mix, grid complexity, and uncertainty of business and regulatory models.

2 Approach:

To meet the new demands of ever-changing operating environments, next-generation electric grids need to become efficient, reliable, and sustainable. Luxoft deploys agile teams of developers, specializing in energy and utilities, to create digital solutions.

3 Solution:

A global energy solutions provider partnered with Luxoft to create Integrated Distribution Management Systems designed specifically to meet the needs of real-time management of distribution networks. Using this suite of applications, utility operators can monitor current network conditions, detect and isolate faults, optimize power distribution, and create reports for outage management results.

4 Result:

The solution enables energy utilities to cut outage response times and restore power to hundreds of thousands of customers in a matter of minutes. Grid optimization through the Integrated Distribution Management Systems has saved clients millions of dollars per year.

Challenge

Meeting the demands of rapidly changing operating environments

The energy and utilities industry has had more than ten years to evolve and support increased power consumption. But, as access and demand for energy expands, utility companies need to ensure they are adapting to this new digital shift. Especially with the deployment of generation and distributed energy resources such as electric vehicles, renewable energy, solar PV, and complex smart grids.

With unprecedented changes on the horizon, the digitization of distribution management systems is becoming a critical factor in keeping pace with the rapidly changing operating environment, and the uncertainty of evolving business and regulatory models. However, to approach the creation of next-generation utility management tools, energy companies must adopt and triage the following issues to remain competitive:

- Hire qualified developers
- Hire developers with industry domain knowledge
- Identify quality delivery processes

Approach

An Agile development team with industry-domain knowledge

Luxoft began working for the client in 2008, providing a team of up to 60 developers and testers to support their internal development staff. Now, the energy industry is rapidly changing and focusing more on clean, reliable, and affordable energy. Our client needed a team that could provide industry knowledge, strong leadership, and proven success to ensure the quality of the final products – especially since the grid is becoming increasingly complex with the deployment of more distributed energy resources (DERs) and distributed generation (DG). To ensure the same level of industry knowledge across all developers, Luxoft implemented an extensive knowledge-sharing process within its teams.

The Luxoft teams developed a digital solution that addressed a number of key utility concerns including: increasing network efficiencies, identifying and preventing issues, and balancing supply and demand. In conjunction with the internal teams, Luxoft delivered an Integrated Distribution Management System (IDMS) solution that provided real-time management of distribution networks.

During the development cycle, Luxoft's Agile teams provided our client with:

- New feature development
- Bug fixes
- Independent testing
- Builds and automated tests
- Installation kit development
- Documentation

Solution

Real-time management of distribution networks

Luxoft worked with the client to create customized Integrated Distribution Management Systems (IDMS); application suites designed specifically to meet the needs of real-time management of distribution networks.

Here are just some of the solution features:

1. **Real-time management view** – presents a unified operating environment displaying the status of the electrical network in real-time geographic and schematic formats.
2. **Outage management** – tools for operators to manage scheduled and unscheduled outages from within a unified operating environment that integrates real-time DMS, SCADA, crew monitoring, and switching orders.
3. **Analysis** – utilizes current power system conditions (SCADA measurements, load schedules, etc.) to detect unbalanced distribution power flow and fault locations. The DNAF can now be scheduled to run periodically by prespecified events or operator demand.
4. **Optimizer** – feeder reconfiguration, system restoration, and Volt/Var optimization tools designed to improve the efficiency and economics of distribution system operations.
5. **Switching operations** – creation of switching orders and safety documents for planned and unplanned outages, network reconfigurations, restoration of unplanned outages, and augmentation of the distribution network.
6. **Historical operations archive** – stores historical data in a relational database and allows for the creation of reports for distribution and outage management. Archived data includes (but is not limited to): DPF solution summaries, fault location solutions and results, released safety documents, and customer calls, meter events, and statuses.

Result

Optimized performance, improved efficiency and the resilience of grids

Over the last ten years, Luxoft has deployed several Agile teams with energy and utilities expertise, to assist our client in the development of digital tools for the optimization of energy distribution networks. This has enabled our client to scale and build a unique solution that allows their customers to:

1. Optimize and reduce network loads, saving millions of dollars and over 100,000 MWh a year
2. Decrease outage response times, restoring power to hundreds of thousands of customers in under three minutes
3. Identify and isolate faults while restoring power to the rest of the electric grid
4. Increase renewable exports onto the grid by 20 percent
5. Quickly coordinate service crews in destructive storm conditions to restore power within hours

By working together, Luxoft and the client developed a fully operational solution that has been improving the resilience and efficiency of today's electric grids, while future-proofing utilities for the increasing demands of tomorrow.

Need to optimize your energy distribution systems?

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