

PSE&G Captures and Transfers the Knowledge of Power System Experts with EPRI Methodology

Success Story



“The project enabled PSE&G to retain expert knowledge before it walked out the door. As a result, we now have access to the experts’ tricks of the trade and critical decision processes that aren’t found in technical manuals, but are essential to understanding and solving urgent power system problems. The benefits to PSE&G include increased system reliability, enhanced emergency response and system restoration, and less reliance on external consultants.”

Karen Noe
Public Service Electric & Gas

The Challenge

Public Service Electric & Gas (PSE&G), like many utilities, is swimming against a demographic tide. Seasoned employees are retiring and taking their knowledge and experience with them. Hiring new workers helps stem the loss of some skilled personnel, but PSE&G is especially concerned about losing the rare, mission-critical knowledge residing in the minds of just a few power system experts.

These veteran engineers possess a deep and broad understanding of PSE&G’s complex power system, which includes equipment installed in the early 20th century as well as the latest microprocessor-based devices. With their knowledge and historical perspective, the experts have developed special ways of analyzing and solving problems—ways that are not taught in schools nor found in books, and that aren’t readily understandable to engineers who, while technically experienced, have less hands-on familiarity with the PSE&G power system.

Capturing and transferring such knowledge is inherently difficult, and commonly used approaches are seldom effective. Training or mentoring, for example take years and yet such person-to-person transfer doesn’t make knowledge broadly accessible or preserve it for future generations. Unstructured attempts at knowledge capture—such as asking departing experts to write down what they know—fail to net truly valuable information such as the decision processes that experts use when evaluating complex technical problems.

Recognizing that the departure of these experts was a significant technical and business loss, PSE&G sought an effective way to preserve their knowledge and make it widely available to other company personnel.

The Solution

To that end, PSE&G turned to EPRI's Human Performance Technology Program for support. The EPRI program has developed tools and a streamlined process for capturing expert knowledge. Unique in the industry, the EPRI process involves three stages: first it identifies valuable knowledge that is to be captured; second, it plans which tools in the extensive toolbox would be most effective at capturing the identified expertise; and third, it implements the plan, resulting in knowledge modules that can be easily transferred to others.

EPRI worked with PSE&G to apply the process to capture the specialized knowledge of retiring experts in PSE&G's System Protection and the Pipe-Type Cable engineering teams. After identifying PSE&G's expectations and objectives, the EPRI team met with each expert in a series of structured interview sessions to elicit their knowledge and obtain additional knowledge resources. The team also interviewed the prospective users of the captured knowledge to determine their actual needs.

The interview sessions helped illuminate the knowledge transfer challenges in each area. The system protection expert, for example, had an intimate historical understanding of the system's relay protection scheme, and drew upon that knowledge when troubleshooting or analyzing events. The pipe-type cable expert had a "big-picture awareness" of the PSE&G underground transmission network that enabled him to diagnose problems with an accuracy that eluded less-experienced operators.

Results

For the system protection case, the knowledge modules the EPRI team developed included text—an overview of asset management functions and an "analysis of events" document that describes the expert's thought processes—and an Excel spreadsheet matrix that includes relay protection schemes, types of equipment protected, and voltage levels, as well as historical information for specific protection schemes.

For the pipe-type cable case, the team developed a series of concept maps, or graphical representations of knowledge that depict concepts and the relationships among them. The concept maps represent the big-picture perspective and stepwise thought processes for diagnosis that senior experts had acquired over many years of experience with the PSE&G underground transmission system.

PSE&G is in the process of placing these knowledge modules on the company's intranet to provide field personnel with fast access to expert information to help solve problems. The company intends for the new knowledge websites to be live, working documents that PSE&G engineers will continually populate with new knowledge as it is obtained.

Benefits

PSE&G's value analysis for the project shows that capturing and transferring expert knowledge helps the company

- Increase power system reliability
- Improve emergency response and system restoration to reduce outage duration
- Reduce reliance on high-priced external consultants.

Contact Information

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