Pacific Northwest NATIONAL LABORATORY

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FUTURE POWER GRID INITIATIVE

A Multi-layer Data-Driven Advanced Reasoning Tool for Smart Grid Integrated Information Systems

OBJECTIVE

The objective of this proposed research is to develop a proof-of-principle decision support tool, Multi-layer, Data-driven Advanced Reasoning Tool (M-DART), for improved power system operation.

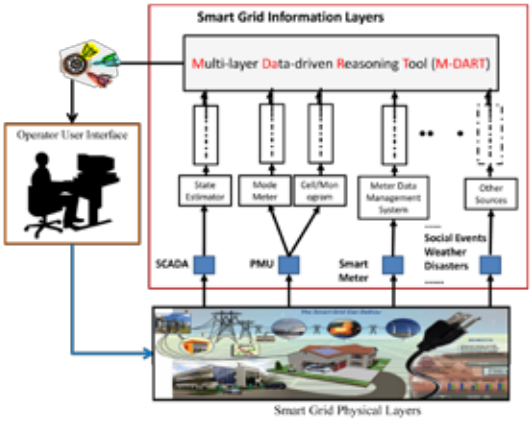
M-DART

- Develops a proof-of-principle decision support tool for power system operation
- Enhances the ability of control center personnel to anticipate and proactively address electric power grid problems.

In contrast to today's grid monitoring technologies, M-DART reasons about results obtained from multiple data sources that are enabled by the smart grid infrastructure. This hybrid approach integrates a knowledge base that is trained offline but tuned online to capture model-based relationships while revealing complex causal relationships among data from different domains.

APPROACH

M-DART will cross-correlate and examine different data sources to assess anomalies, infer root causes, and anneal data into actionable information.



The M-DART Architecture

The development of a prototype M-DART will focus on the following technology advancements:

- Analyze information from multiple data sources
- Subject-matter expertise captured in ontological model-based representation
- Real-time data used to update knowledge base
- Automatic correlation of data sources
- Proactive response.

U.S. DEPARTMENT OF ENERGY

FOCUS AREA 3 - VISUALIZATION AND DECISION SUPPORT

IMPACT

The successful completion of the M-DART project will result in

- less data traffic in communication networks
- an earlier and more accurate detection of system events, and
- more proactive response from grid operators to emerging grid problems.

FOCUS AREA

Focus Area Three aims to convert large amounts of model and sensor data into information and knowledge to support decisions in grid operation, planning, and policymaking. This area concentrates on the development of coordinated visualization interfaces and decision support capabilities in a modular, extensible software environment that can be used for both real-time grid operations as well as long-term planning. **Focus Area Lead:** Paul Whitney (paul.whitney@pnnl.gov)

ABOUT FPGI

The Future Power Grid Initiative (FPGI) will deliver next-generation concepts and tools for grid operation and planning and ensure a more secure, efficient and reliable future grid. Building on the Electricity Infrastructure Operations Center (EIOC), the Pacific Northwest National Laboratory's (PNNL) national electric grid research facility, the FPGI will advance the science and develop the technologies necessary for meeting the nation's expectations for a highly reliable and efficient electric grid, reducing carbon emissions and our dependence on foreign oil.

ABOUT PNNL

Pacific Northwest National Laboratory is a Department of Energy Office of Science national laboratory where interdisciplinary teams advance science and technology and deliver solutions to America's most intractable problems in energy, the environment and national security. PNNL employs 4,900 staff, has an annual budget of nearly $1.1 billion, and has been managed by Ohio-based Battelle since the lab's inception in 1965.

For more information, please visit the FPGI website or contact:

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