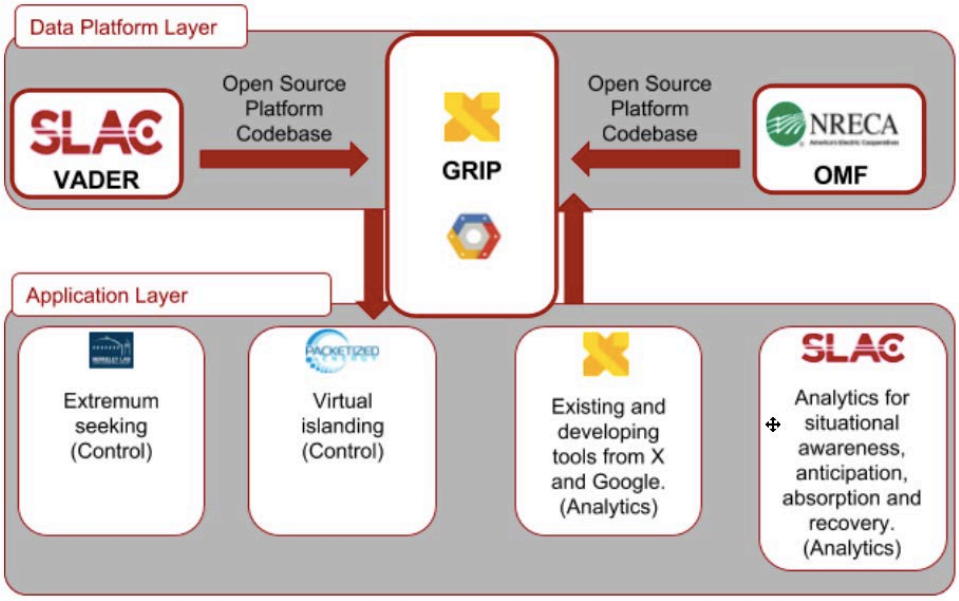
Grid Resilience and Intelligence Platform (GRIP)

CHALLENGE

Extreme weather and other disruptive events such as cyber attacks pose an enormous and increasing threat to the nation's electric power systems and the associated socio-economic systems that depend on reliable delivery of electric power. Yet software for resilient design and recovery is not available commercially. Utilities urgently need a modern, open-source platform that helps them better plan for extreme events, adapt to them as they occur, and quickly restore operations afterward.



The Data Platform Layer integrates grid-related databases. The Application Layer contains the controls and analytics for event anticipation, absorption, and recovery. The two layers work together to help operators anticipate, respond to, and recover from extreme events.

APPROACH

In collaboration with industry partners, this project will develop and validate a new software platform to help operators anticipate, respond to, and recover from extreme events.

Based on artificial intelligence, the new platform will

- demonstrate machine learning and artificial intelligence from different data sources to *anticipate* grid disruptions due to extreme weather and distribution system events;

At-A-Glance

PROJECT LEAD

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LAB COLLABORATOR

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PARTNERS

- National Rural Electric Cooperative Association
- Southern California Edison
- Packetized Energy
- Vermont Electric Cooperative
- Presence
- University of California Berkeley
- Stanford University

BUDGET

DOE: $6M
Industry: $1.6M

DURATION

October 2017 – September 2020

TECHNICAL AREA

Security and Resilience

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- validate controls for distributed energy resources for *absorbing* grid events; and
- reduce *recovery* time by managing distributed energy resources in the case of cyber attacks that impact communications.

The platform will integrate existing Google™ tools; capabilities developed by previous grid projects; public data sets such as weather, electricity load, generation, and pricing; and site-specific data. The resulting extensible and open platform will enable visualization and editing of circuit network data.

The platform will be validated at three sites. The Camden Substation in Santa Ana, California will provide data and calibrated models of the substation for developing analytics to anticipate grid events. In Burlington, Vermont, water heaters with storage and photovoltaic systems will be used to validate a virtual islanding capability for controlling distributed loads in a disruption scenario. A Midwest utility (to be selected) will validate the control capability for stabilizing voltage at a distribution substation without the need for centralized communication.

EXPECTED OUTCOMES

The platform will be made available through the National Rural Electric Cooperative Association to all its members and through Presence as a commercial platform.

This project is the first to use artificial intelligence to help the grid manage power fluctuations, resist damage, and bounce back faster from storms, solar eclipses, cyberattacks, and other disruptions. While the approach will be tested on a large scale in California, Vermont, and the Midwest, it will have national impact.

LAB TEAM

SLAC NATIONAL ACCELERATOR LABORATORY

BERKELEY LAB

As part of the U.S. Department of Energy's Grid Modernization Initiative, the GMLC is a strategic partnership between DOE Headquarters and the national laboratories, bringing together leading experts and resources to collaborate on national grid modernization goals. The GMLC's work is focused in **six technical areas** viewed as essential to modernization efforts:

Devices and Testing | Sensing and Measurements | Systems Operations and Control
Design and Planning | Security and Resilience | Institutional Support