GMLC Project Communications Summary

Date: 2/28/2020
Project Title: Testing Network and Open Library
Project Number: GMLC 1.2.3
Principal Investigator: Matthew Lave (Sandia)
Person Completing this Document: Matthew Lave

1. What problem is the project solving or what opportunity is it addressing?

The electric power grid is a complex system that involves a wide variety of evolving technologies. Testing resources and validated models are crucial to this technology development. Vast testing and modeling capabilities exist within the DOE National Laboratories, but there was no central, up-to-date information repository regarding these capabilities, resulting in people being unaware of what capabilities exist or how to best utilize them. To address these needs, we developed the GMLC Testing Network (TN) cataloging testing facilities and the Open Library (OL) of model, tools, and test procedures. Combined, the TN and OL form gridPULSE, the Public User Library for Systems Evaluation of grid-related devices. gridPULSE is instantiated through a website (formerly http://gridmodtools.org, transitioning to http://inl.openlibrary.gov) where users can browse the information contained in the TN and OL.

2. Who collaborated on this project? (e.g. labs, universities, utilities, vendors, others)

Team members were initially Sandia National Laboratories (lead lab), Idaho National Laboratory (+1), Argonne National Laboratory, Brookhaven National Laboratory, Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, National Renewable Energy Laboratory, Oak Ridge National Laboratory, Pacific Northwest National Laboratory, and Savannah River National Laboratory. All ten of these Labs, plus the National Energy Technology Laboratory and SLAC National Accelerator Laboratory provided information to the Testing Network capabilities catalog, and most provided models to the Open Library. Additional collaborators from universities, utilities, and industrial vendors were engaged towards the end of the project to provide input to the sustainability plan.

3. What is the solution or outcome that the project delivered?

The project resulted in the creation of gridPULSE (formerly http://gridmodtools.org, transitioning to http://inl.openlibrary.gov), which presents the Testing Network with information on testing facilities and capabilities, and the Open Library which is the repository for DOE-created open-source models and tools.

The Testing Network is being integrated into similar tools run by the DOE Office of Technology Transitions (OTT), which will better enable partnerships with outside users and provide continued support for the Testing Network beyond this project. As with any inventory, ongoing updates are critical to maintaining accurate information. The Open Library is and will continue to be available publicly at http://inl.openlibrary.gov. Additional sustainability options for the Open Library to increase its impact continue to be considered.

4. How does the solution/outcome break new ground or how is it differentiated from other R&D projects?

Consistent presentation of information on National Lab facilities and capabilities had not been done before. Previously this information, when available, was scattered on each National Lab's individual website or other isolated publications. It is different from other projects in the scale (10 National Lab team members, 2 additional contributors) of the information presented, as well as in the curation of the information. The diversity of technical expertise among team members allowed for a comprehensive compilation of accurate, technically detailed information about a wide-variety of testing facilities and modeling capabilities.

5. How is the deliverable or outcome of the project being used?
    - By industry?

Industry users are accessing the gridPULSE website and/or downloading the testing capabilities catalog. This is helping them to better understand resources available at the National Labs. The Testing Network can be used to identify the best laboratory for testing a newly-developed device, and the Open Library is a free resource which can avoid industry users from having to create and validate their own models.

    - By government?

Government users, including DOE and DOD are using the Testing Network to obtain a quick understanding of capabilities and to identify gaps. National Labs have used the Testing Network to identify partnering opportunities for funding calls. The Open Library allows government users to avoid duplication of models by understanding and, where appropriate, utilizing existing models.

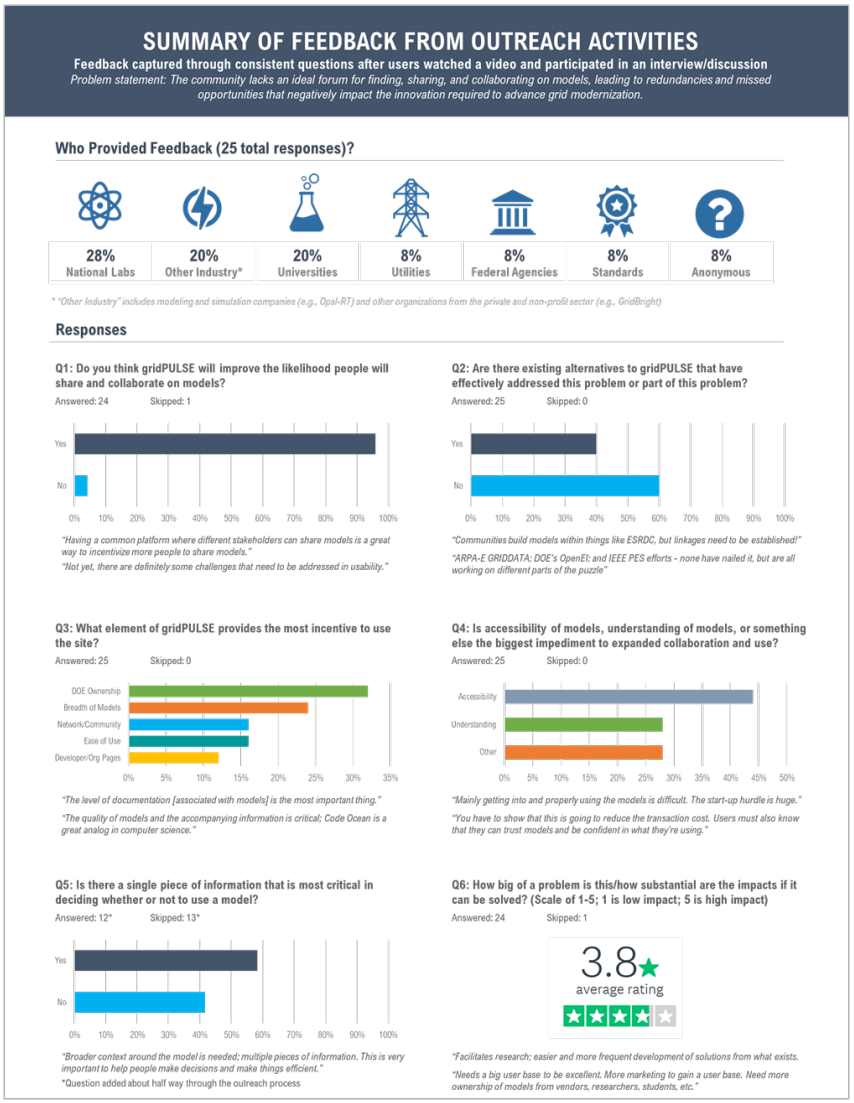
    - Other?

Like industry and government users, university users have found value in understanding National Lab testing capabilities presented in the Testing Network to find partnerships, avoid unintended duplication, and develop complimentary capabilities. Universities are

also using the Open Library to access Lab-created models and reach out to model developers.

6. Impact metrics – has this project impacted grid modernization in any quantifiable way? (E.g. reliability, resiliency, efficiency, DER integration, event response, etc.)

This project is focused on information dissemination and efficiency in understanding National Lab capabilities and identifying partnership opportunities. As part of stakeholder outreach at the end of the project, we asked stakeholders to evaluate the value of gridPULSE over several metrics, as shown in the figure below. We received strong indications that gridPULSE will improve sharing and collaboration by the National Labs. This feedback, and suggestions for paths forward beyond this project, are included in the sustainability plan: "gridPULSE Sustainability Plan and Options," shared with technical monitors December 2019 (available upon request).



7. What IP and/or industry recognition or adoption has the project resulted in?

- Open Source Adoption

The Open Library (http://openlibrary.inl.gov) facilitates creation and dissemination of open-source models.

- Conference Presentations

- **"Grid Modernization Laboratory Consortium Testing Network (GMLC 1.2.3)," talk presented at IAPG Electrical Systems Working Group Meeting, Dayton, OH, March 2018, (**https://www.osti.gov/servlets/purl/1506192),
- **"gridPULSE: Catalog of National Laboratory Testing Resources for Grid Devices," published electronically, March 2018 (**https://www.osti.gov/biblio/1528814-gridpulse-catalog-national-laboratory-testing-resources-grid-devices).
- **"gridPULSE: Public User Library for Systems Evaluation to Accelerate Grid Modernization," poster presented at IEEE 7th World Conference on Photovoltaic Energy Conversion, June 2018, (**https://ieeexplore.ieee.org/document/8547427).

8. If you look ahead 5-10 years, how do you see the work of this project impacting grid planning and operations in the U.S.?

This work will lead to more efficient collaborations between and among National Labs, industry, and universities. It has already been utilized to help inform project teams for proposals to funding calls and will continue to do so. Integration of the Testing Network into the DOE office of Technology Transitions will make it a sustained resource to improve the utility of testing resources and to encourage partnerships. Similarly, the Open Library can continue to be the repository for National Lab-created, publicly available models, tools, and test procedures. As it continues to be populated with additional models, its value and regular use will continue to grow. Overall, the result of this project will be better awareness of National Lab capabilities, more efficient utilization of these capabilities through less overlap and duplication, and more efficient partnerships.