Pacific Northwest
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Update on Energy Storage Reliability Codes and Standards Activities

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DOE OE Peer Review
Online

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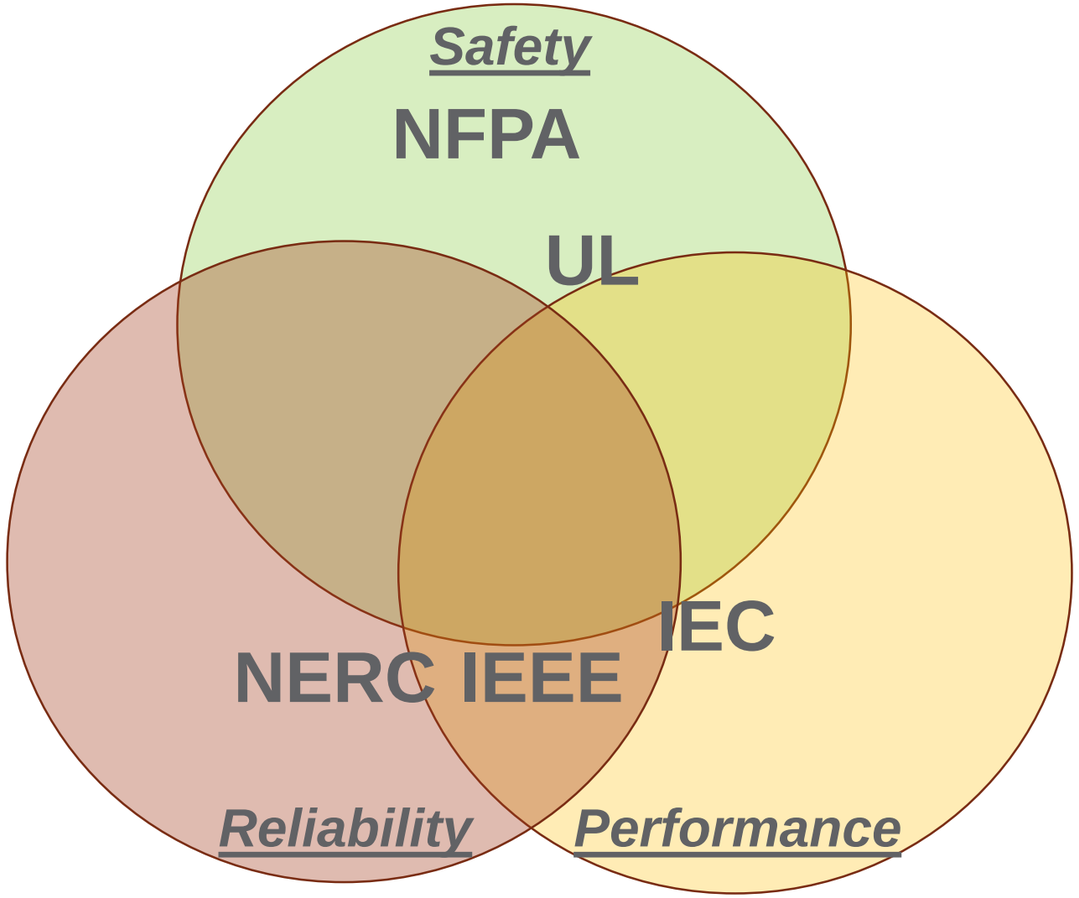
ES Reliability C&S Presentation Outline

- Background
- FY20 Activity & Milestones
- Challenges and Plans

Coordinating Across Safety, Reliability and Performance ES Codes & Standards



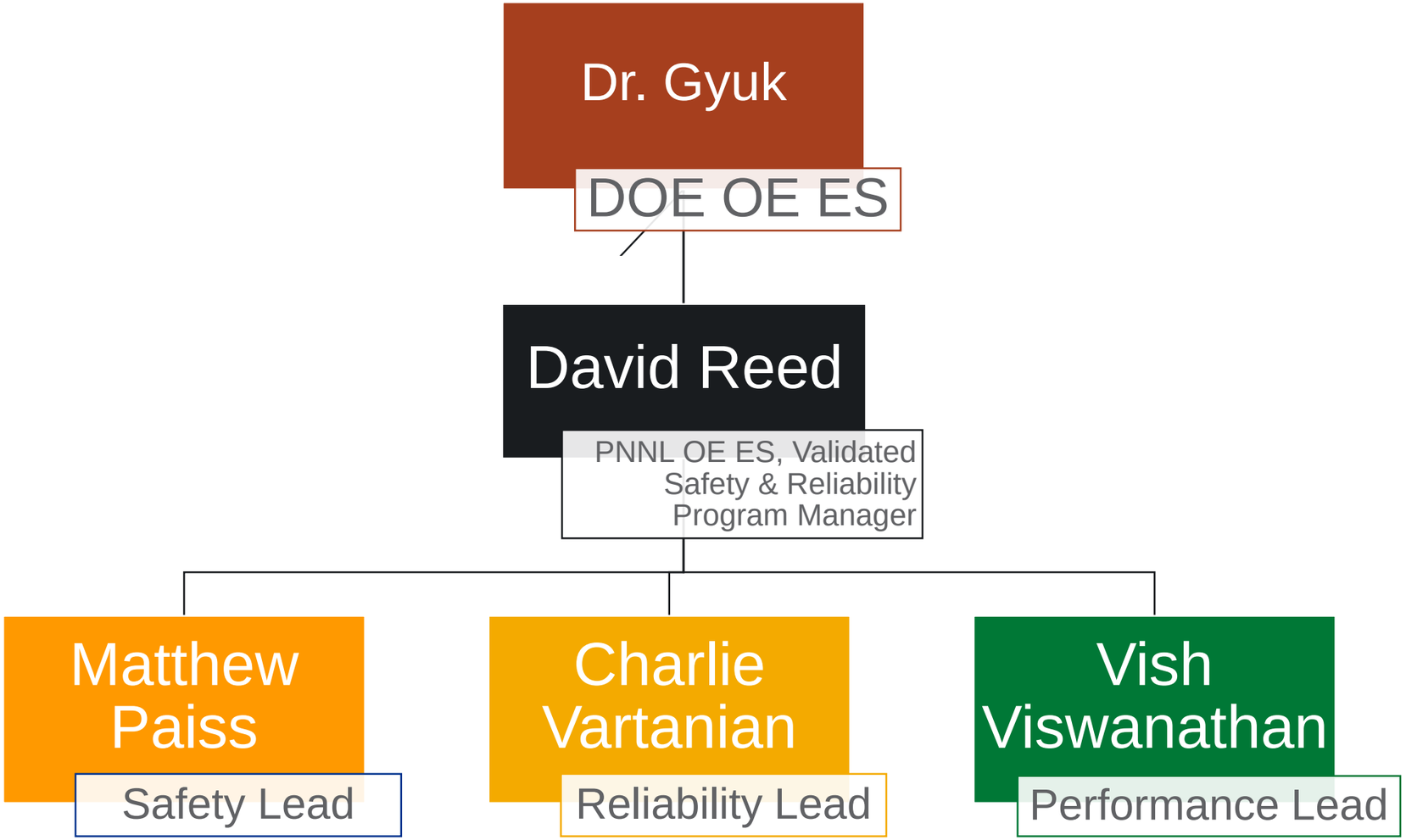
PNNL OE ES's Codes & Standards (C&S) development activities include participation in:

Safety: NFPA 855, UL 9640, UL 1974

Reliability: IEEE, NERC

Performance: IEC TC 120, *EPRI ESIC (non-SDO), MESA/SunSpec (non-SDO)*

ES Safety, Reliability & Performance C&S Team



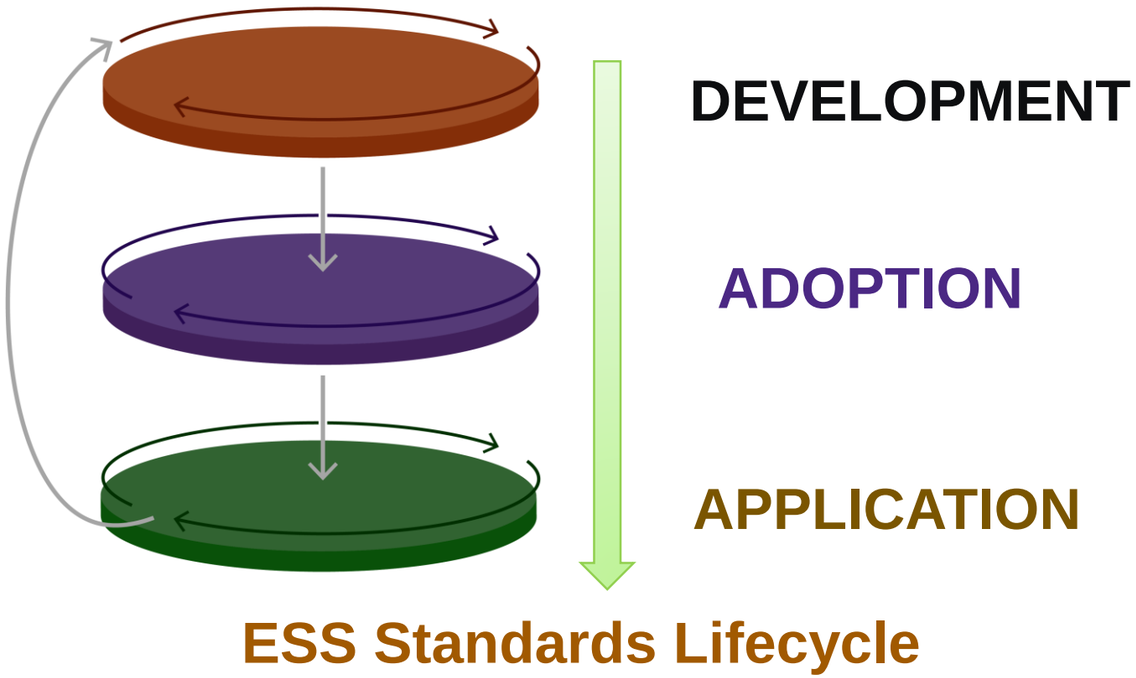
ES Reliability C&S Project Purpose

Purpose

- Foster deployment and effective use of energy storage technology through development, adoption, and application of reliability technical standards.

Impact

- Lower barriers to ESS adoption and improved reliability and resiliency of ESS's and power systems.



ESS Standards Lifecycle

ES Reliability C&S Program Objectives

- Identify and Fill Energy Storage Reliability C&S Gaps
- Identify and Demonstrate ES Reliability C&S Best Practices
- Develop and Demonstrate Methodologies for ES Reliability Tracking and Reporting

ES Reliability C&S Program Metrics & Milestones, FY20

4, Technical Standards Development Activities Supported by PNNL OE ES

- IEEE 1547.9, ES Interconnection Standard, *McDermott, Asgeirsson, Vartanian*
- IEEE 2800, Inverter Based Resources Standard, *Elizondo*
- EPRI ESIC, *Crawford, Viswanathan, Paiss*
- MESA Specifications, *Kolln*

2, Number of ES Technical Standards Created or Updated

- IEEE 1547.9 Draft 3 Completed (3 of the 6 estimated needed before completion)
- MESA-Device, Certification Procedure Report

4, Number of ES Integration Demonstration Projects

- GIMRE, Grid Integration of Marine Renewable Energy, BESS purchase delayed, now targeted for Q3 FY21
- Cordova Energy Storage Integration, Final Task(3) detail scope identified: design and deploy new PMU to add time-synchronized performance data from Cordova Hospital, in FY21
- UAF/ACEP Energy Storage Integration, integrated thermal and electrical load info and modeling. Contracted and started in FY20. Field data recording planned to start in FY21
- King County Metro 2nd Life, scope narrowed to Test Procedure development. Demo of 2nd Life use by KCM contingent on funding. Implement test infrastructure planned for FY21.

ES Reliability C&S Program, Challenges

- Formal Standards Developing Organizations (SDO's) are in early stages of development for grid ESS standards:
  - The rapid pace of industry adoption and deployment of the technology is ahead of SDO's pace of creating and updating standards.
  - *Industry groups offer interim solution, and provide 'best practice' input to formal SDO's*
- Modern Grid Connected and Interactive ESS's are Predominately Inverter-Based Resources
  - 'Smart inverter' standards are still evolving, and are very PV-focused
  - ESS's have unique characteristics and capabilities that well-thought out standards will support. Badly designed, or lack of, standards will be barriers to full utilization and benefit from ES.
- Specific Challenges with Solutions In Progress
  - P1547.9 scope impact from "net power" criteria. Interconnection of V2G.
  - Basic ES characteristics still not defined within IEEE: SoC, SoH, On/Off status
  - Example of major benefits enabled by effective C&S – *ES performing enhanced Fast Frequency Response to deliver inertia support to power systems. IEEE & NERC topic.*

ES Reliability C&S Program, Looking Forward

- Complete and report EPRI ES Reliability Data project results in FY21
- Complete and report CECESI project results in FY21
- Deploy GIMRE BESS and start recording field results in FY21
- Complete draft IEEE 1547.9 Guide to ES Interconnection in FY21
  - IEEE approve and then publish in FY22
- Start new IEEE BESS-EMS (ESMS) Standard in FY21
  - IEEE project request completed in FY20
  - This project will begin writing this new standard in FY21
  - PNNL initiated, but SNL (Schoenwald, Nguyen) will lead this new IEEE Working Group
- Start process to add large BESS projects to North American Electric Reliability Council's (NERC) reliability-reporting process and database, FY21-22

Acknowledgement

Dr. Imre Gyuk, DOE – Office of Electricity, Energy Storage Program

ES Reliability C&S Project's collaborative industry partners include,

- ***IEEE Standards Association***
- ***MESA Alliance***
- ***EPRI Energy Storage Integration Council (ESIC)***
- ***Cordova Electric Cooperative***
- ***University of Fairbanks Alaska, Alaska Center for Energy & Power (ACEP)***
- ***King County Metro***

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Thank you

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