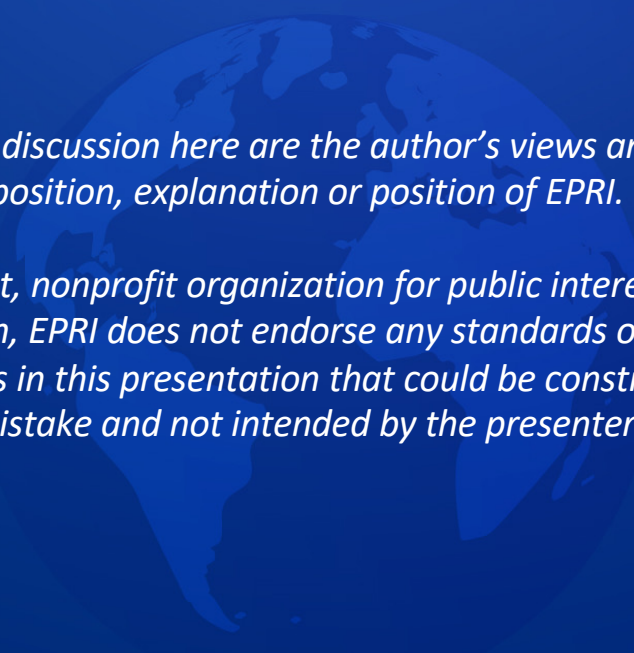# DER Integration and Control

One step at a time.

Dan Ernstmann
Senior Technical Leader
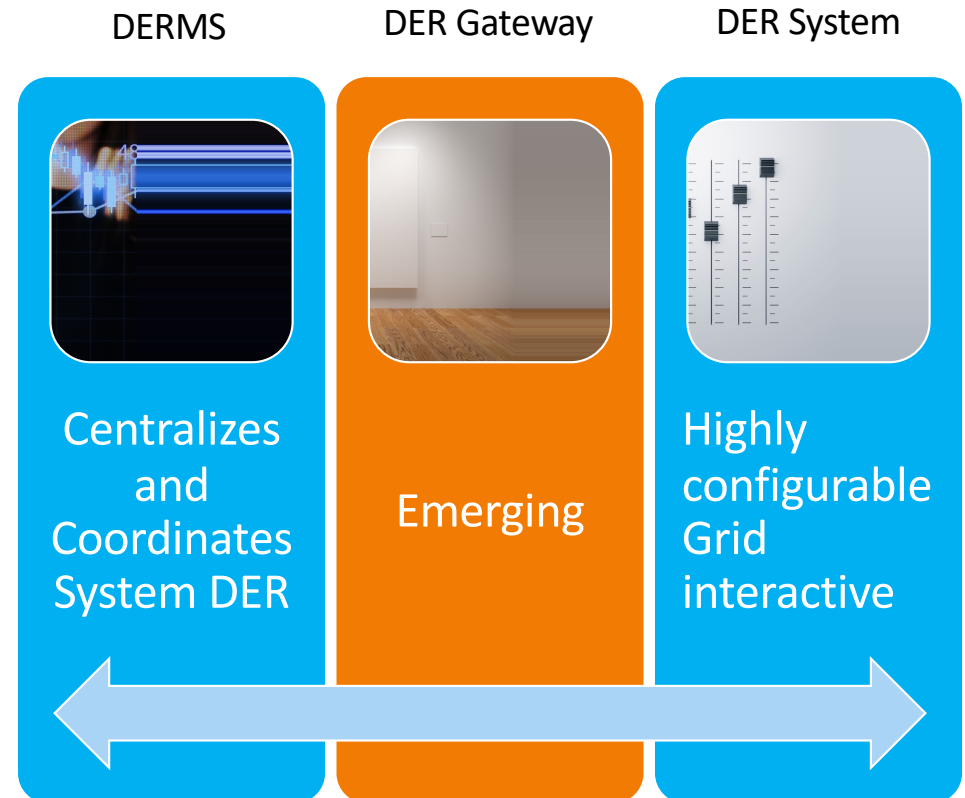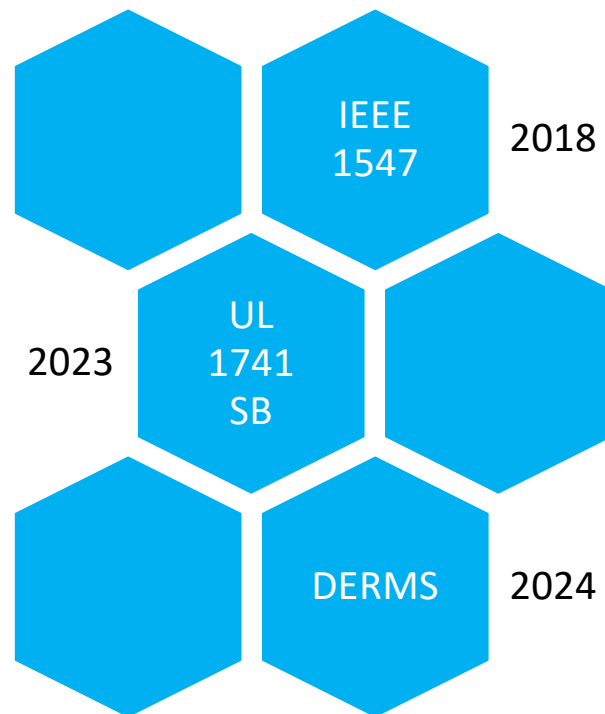
CIGRE GOTF Paper Session 1B
October 10, 2023

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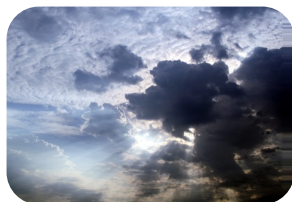
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Background

IEEE 1547 — 2018

2023 — UL 1741 SB

DERMS — 2024

DERMS | DER Gateway | DER System

Centralizes and Coordinates System DER | Emerging | Highly configurable Grid interactive

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Why no gateways yet?

- DERMS Entry Level Capabilities:

DER Forecasting

Load Control
(Demand Response)

Large DER
Operations

- DER Penetration $\dfrac{Aggregate\ DER\ Rating\ (kW)}{Load\ Capacity\ (kW)}$

Attribute	Sentiment
Customer owned assets	System operator not accountable for maintenance or optimization
Non-dispatchable	Predicable output and passive configuration
Low penetration	Misconfiguration and misoperation have low risk
Many small systems	Communications at scale would require a second AMI network.

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Business as Usual, what risks might arise?
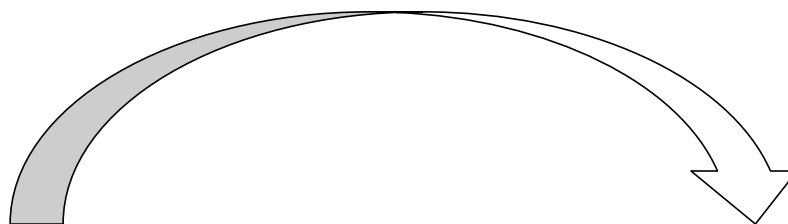
- Tactics for increasing hosting capacity
  - Voltage regulating DER
  - Reliable re-entry
  - Flexible storage
  - Non-export and limited-export DER

- Increased risks as penetration increases
  - More system volatility
  - Power quality degradation
  - Utility asset mis-operation
    - Nuisance Tripping
    - Increased Voltage Regulation Operation

Risks easily mitigated by DER configuration.

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Essentials, Small Lifts, Foundational Capabilities

Verify Configuration (read)

- Audit or govern devices via interrogation "*Is this DER compatible with this region of the network?*" enables reliable consideration of DER performance in system planning, design, and operations.

Dictate Operability (write)

- Over time the system operator may find opportunity to mature the configuration of fielded devices. The capability to update the operating profile enables flexibility, allows the operator and end-user to tailor DER performance as network conditions evolve long term.
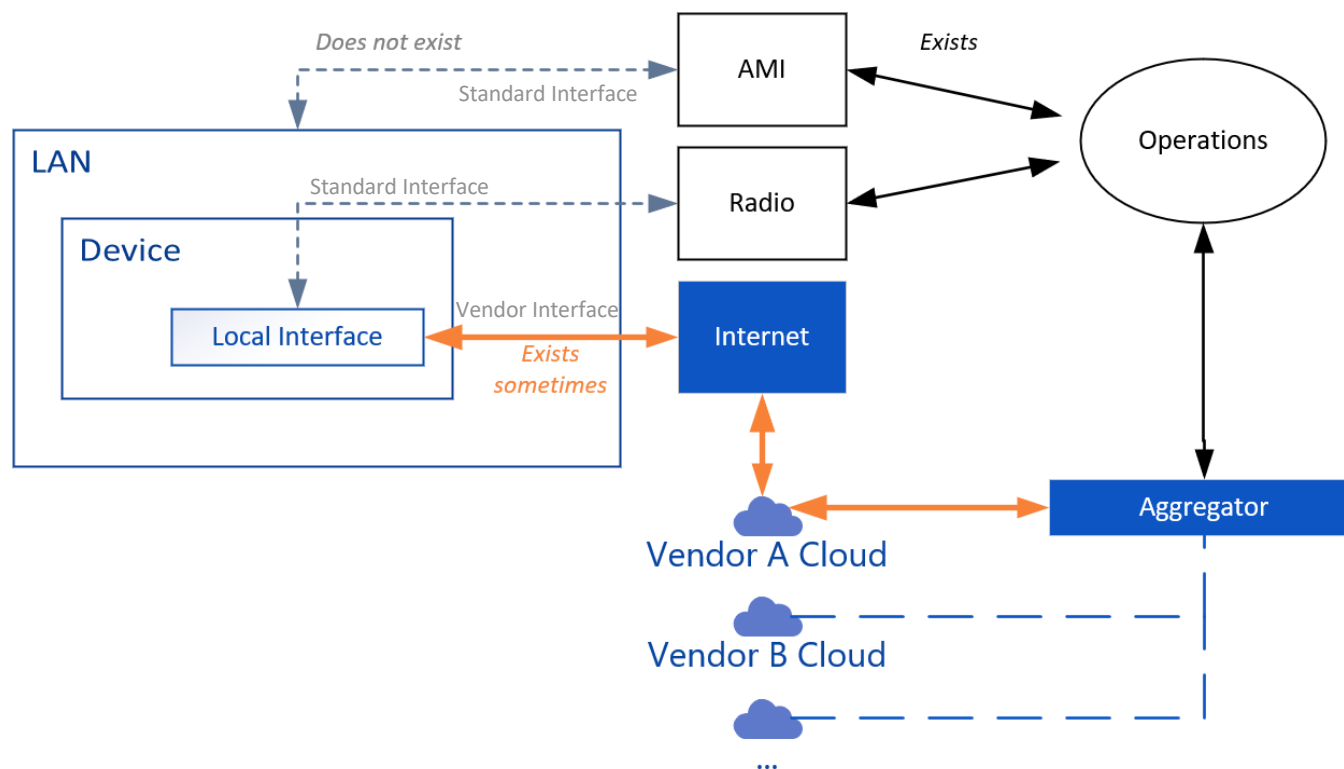
Validate Performance (read)

- Modern AMI and direct DER interface can build an incredible operational picture for DERMS. This informs DER functions at the top level, improving system wide DER insights. Operators can **forecast available capacity**, **enforce export limits**, and even **measure DER performance degradation over time**.
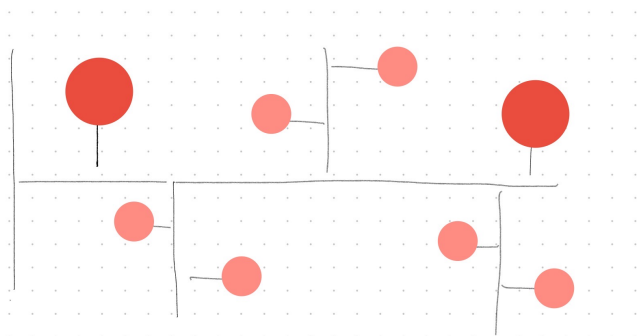
Non-real time
Two-way communication
Simple messages

Validate
Performance

Dictate Operability

Verify Configuration

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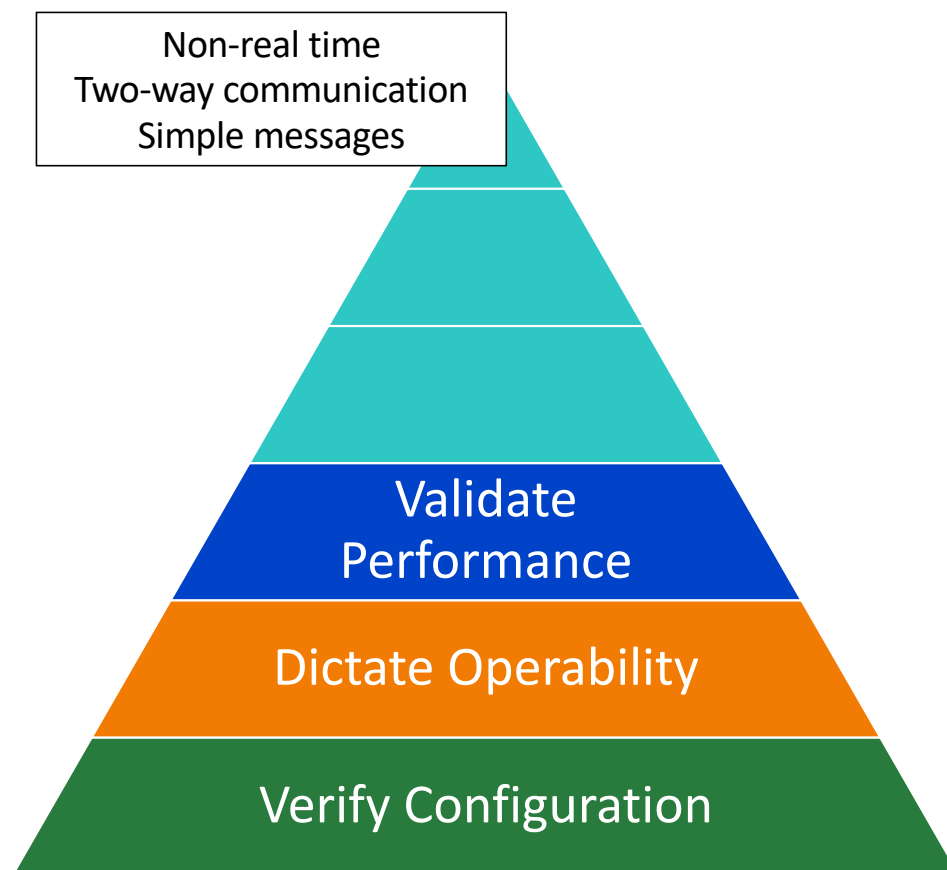
Communication Mediums

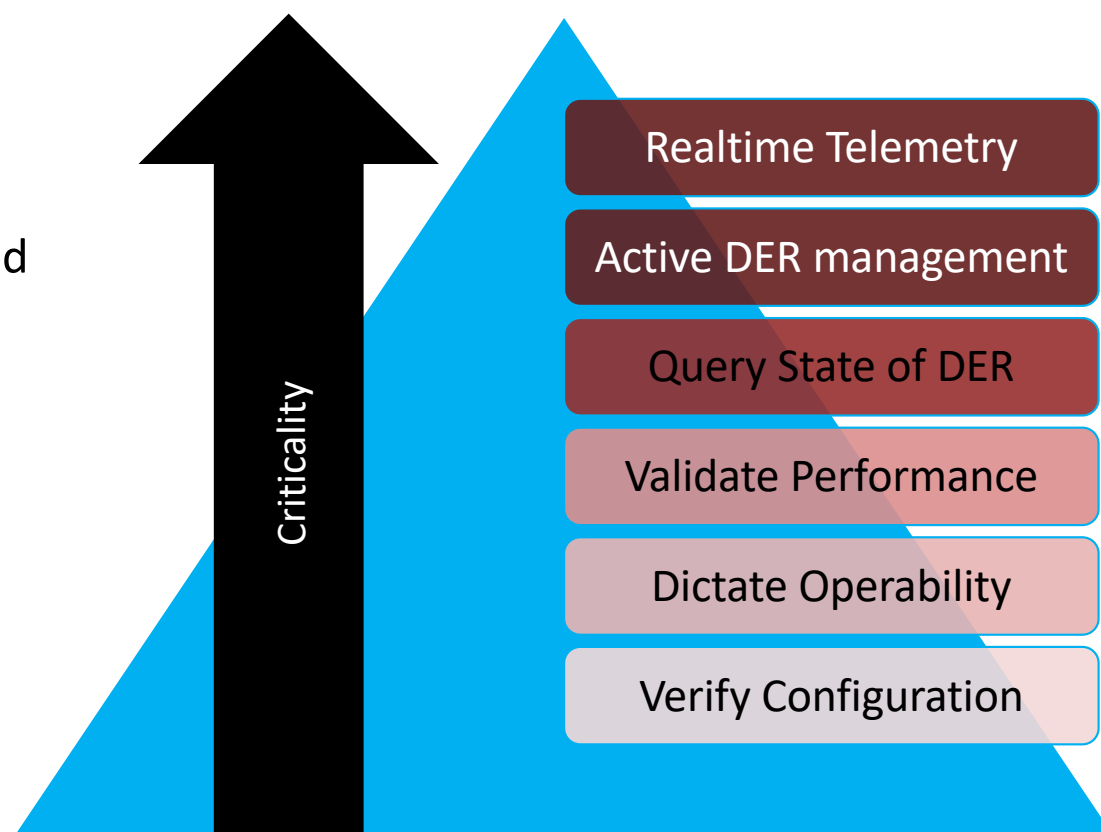EPRI | ELECTRIC POWER RESEARCH INSTITUTE

Capability Hierarchy

- <u>Foundational capabilities</u> are building blocks or modules essential to most of the DER fleet.

- <u>Advanced capabilities</u> can be established for large instances or critical DER aggregations as needed.

The system includes DER of various levels of capability

Criticality

- Realtime Telemetry
- Active DER management
- Query State of DER
- Validate Performance
- Dictate Operability
- Verify Configuration

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Together…Shaping the Future of Electricity

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