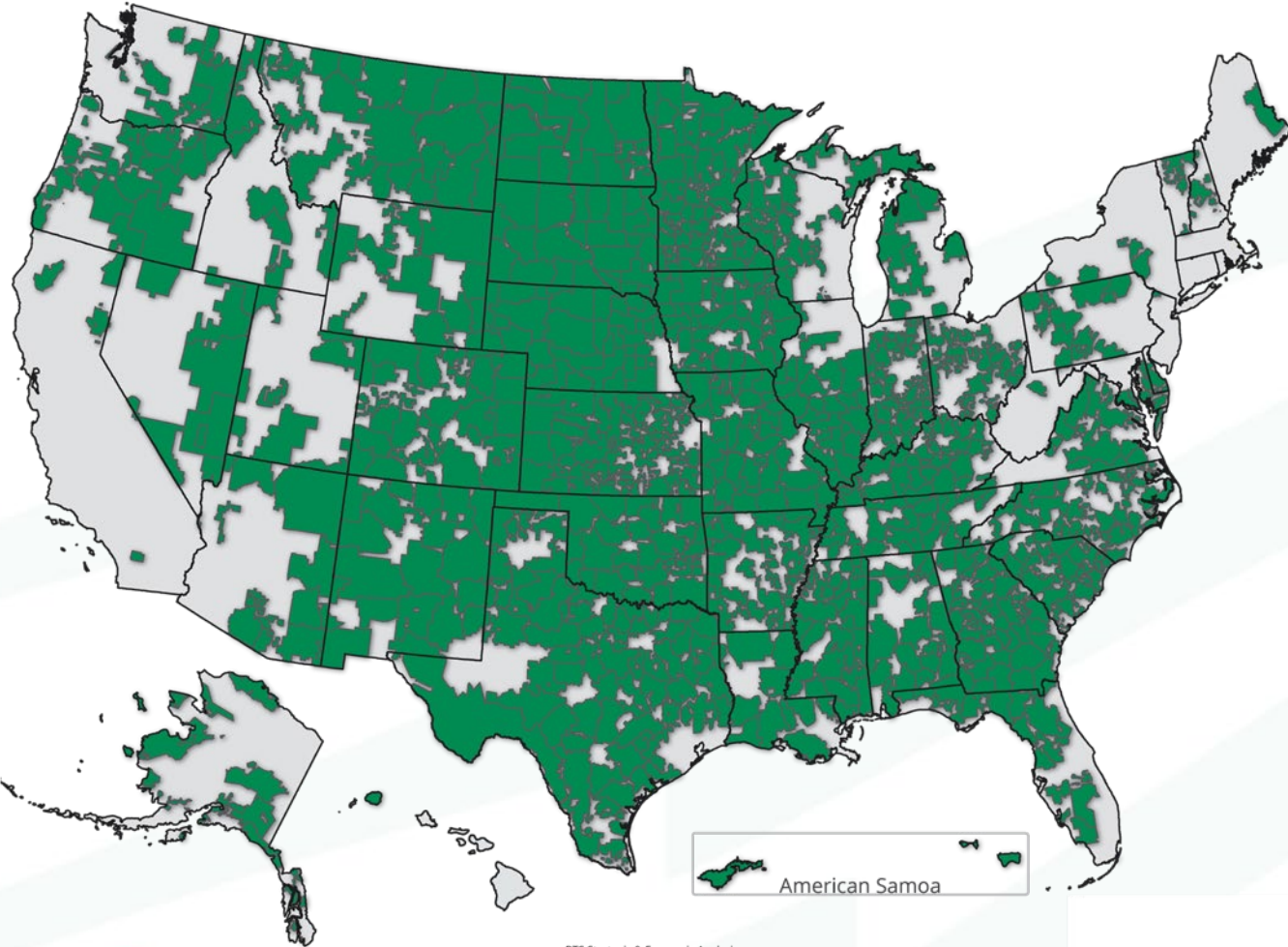# Big Data Analytics in the Utility Setting
Experiences, Barriers and Future Needs
Operators, Municipal and Cooperative Utilities

America's Electric Cooperatives

BTS Strategic & Economic Analysis
Copyright © 2016 by the National Rural Electric Cooperative Association. All Rights Reserved.
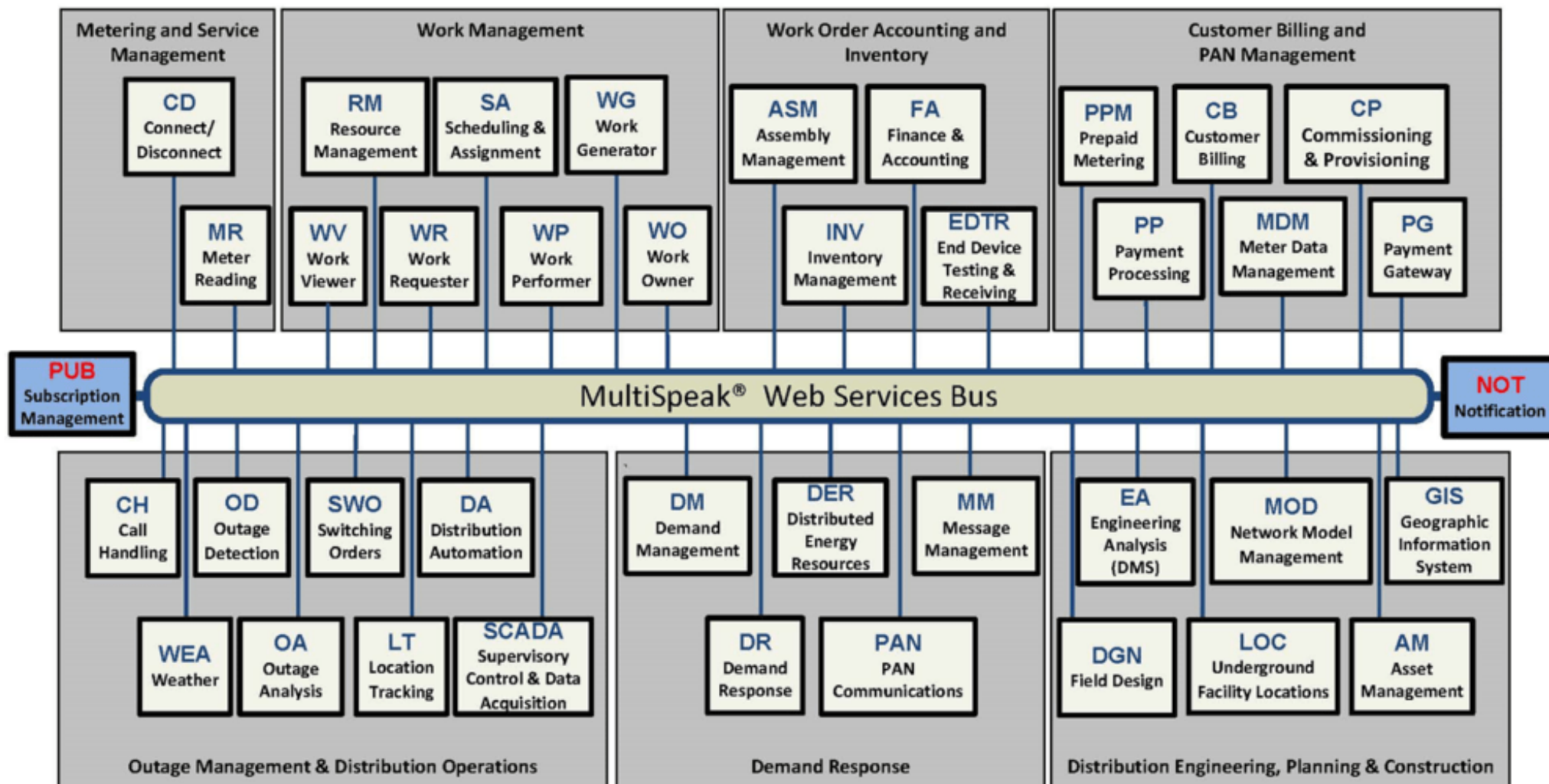
- Serve 42 million people in 47 states through 65 generation & transmission (G&T) co-ops and 840 distribution co-ops

- Own and maintain 42% of the nation's distribution lines

- Average 7.4 consumers per mile of distribution line versus 34 at IOUs, 48 at Munis.

- NRECA Research, national coordinator.

75 Years of Service
NRECA
America's Electric Cooperatives

How Big?

- Largest source of new data: smart meters (AMI)

- Consider the largest coop (500k meters), highest read rates and metric volumes available: processing **1 terabyte/year of data**.

- For comparison, Google across its business processes **6,300,000 terabytes/year**[1].

- Grid not a candidate for exotic storage and processing technology.

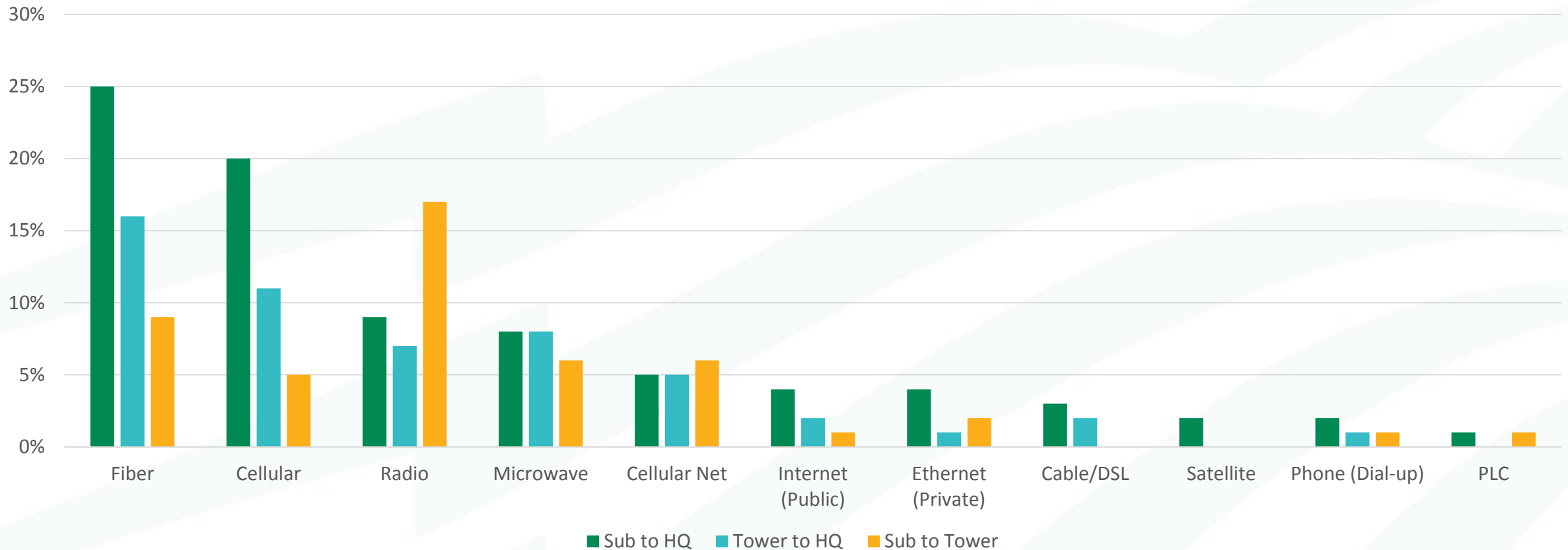- However, huge opportunities and challenges exist in realizing value from data.

[1]Jeffrey Dean, et al [Google]. *MapReduce: Simplified Data Processing on Large Clusters*. 1 Jan. 2008, dl.acm.org/doi/10.1145/1327452.1327492.

Big Integration Challenges

- Biggest IT pain point: integration
- Been chipping away at this interop problem for decades
- Huge opportunity for future applications

Revision 0.0.6
Dated 01/10/2017

Big Communication Challenges

AMI Communications Methods

Legend: ■ Sub to HQ ■ Tower to HQ ■ Sub to Tower

Ifebigh, Adaora. "NRECA's 2019 Co-Op Technology Survey." *Cooperative.com*, NRECA, 6 Mar. 2019, www.cooperative.com/topics/data-analytics/Pages/NRECAs-Co-op-Technology-Survey.aspx.

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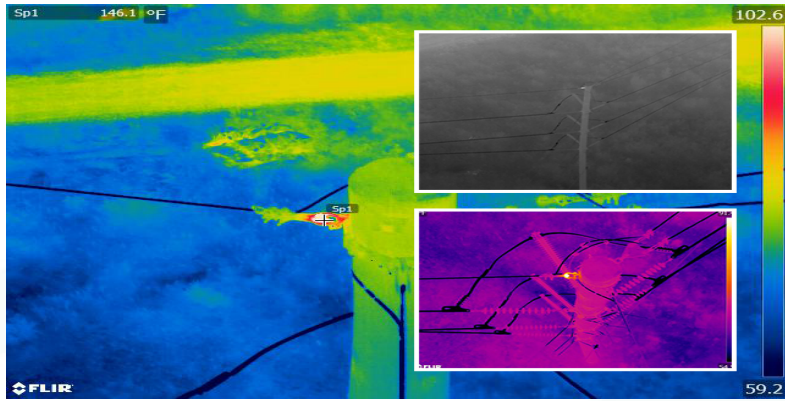NRECA
America's Electric Cooperatives

Big Opportunities in Machine Learning Pt. 1

- Emerging ML Tools:
  - Load forecast and storage control
  - Load, PV disaggregation
  - Equipment anomaly detection
  - Phase identification
- Initial deployments with coops, seeking more.

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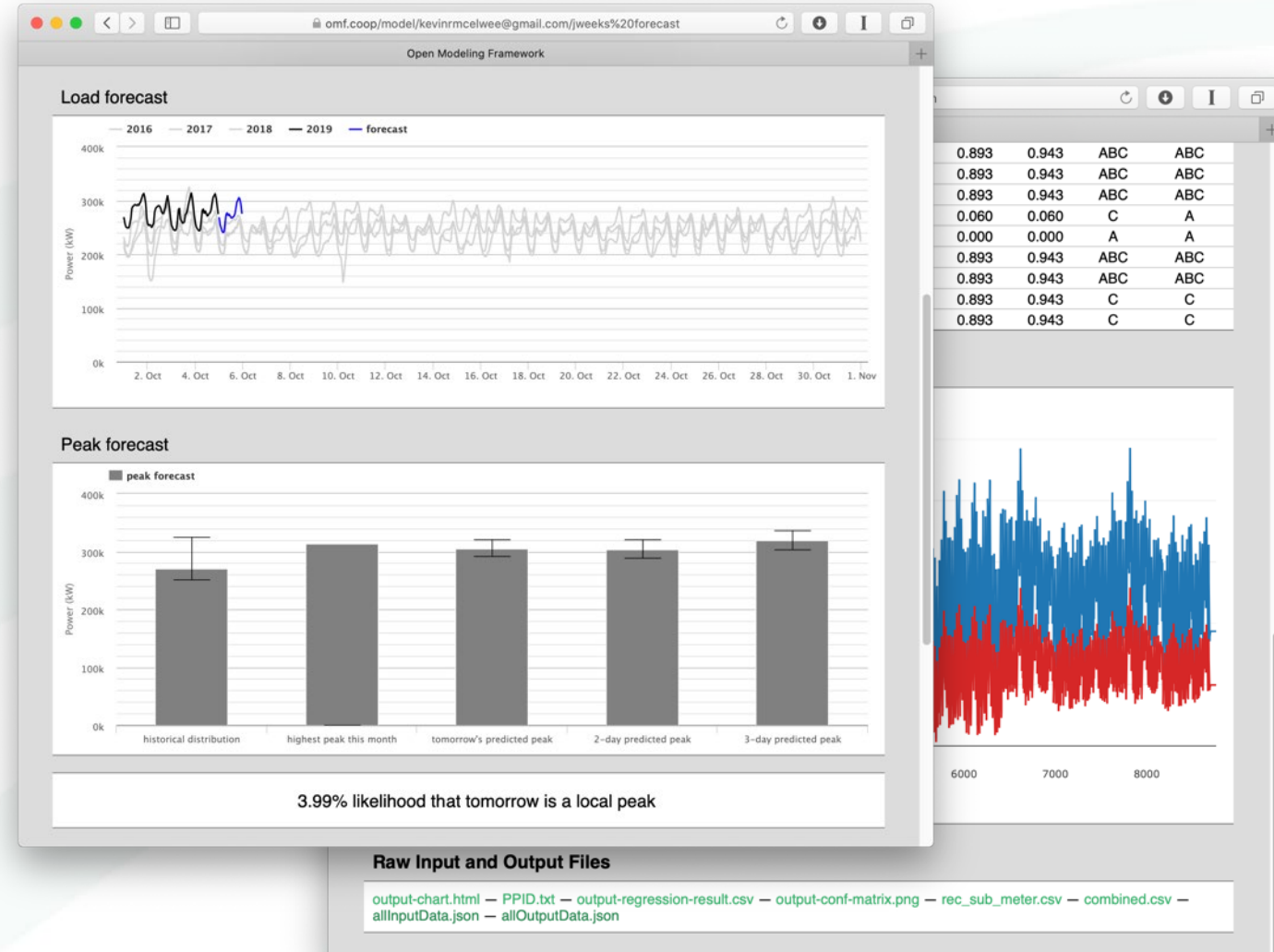
Big Opportunities in More Data


Drone Flights

μPMUs

3D Asset Scans

Big Opportunities in Machine Learning Pt. 2

- 23% of coops fly drones, and 13% are planning to soon

- Initial analytical prototype: apply computer vision techniques to drone imagery to flag assets and/or problems

- DOE efforts just starting up

- Building a database of drone imagery

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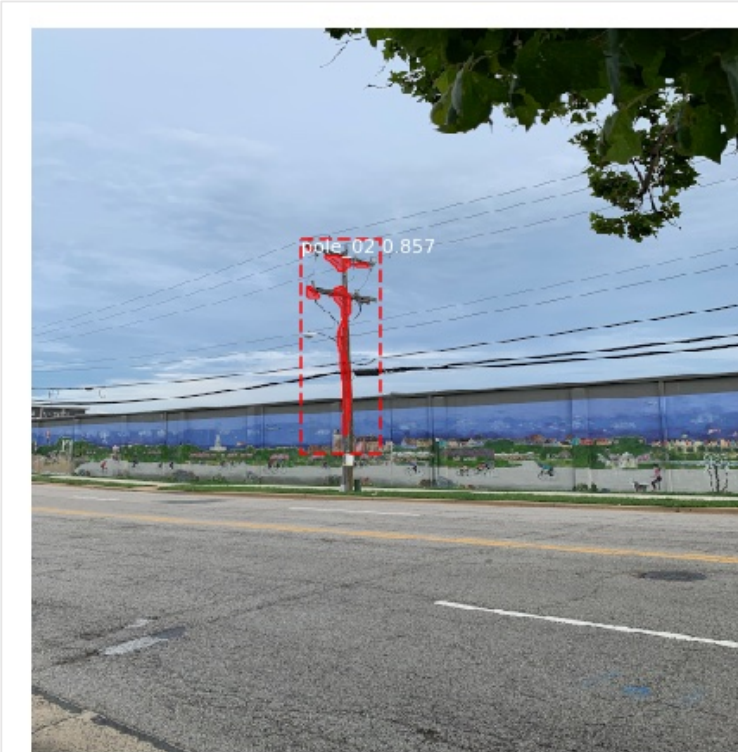
Big Opportunities in Planning/Ops Integration

Grid Configuration
Network Models
Future Scenarios
Utility ICS Topology

Grid Telemetry
AMI/AMR
SCADA
Distribution PMUs
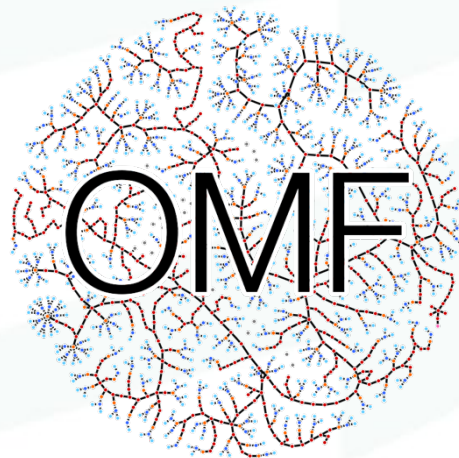
**Configuration
And Analysis**

**Calibration Data,
Physics Problems**

OMF

GridState

Conclusions

- Utility data volumes are modest but difficult to integrate, and collected over diverse networks.

- Challenges will continue to increase with new sensor deployments.

- Huge opportunities in machine learning applications.

Feedback?
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