



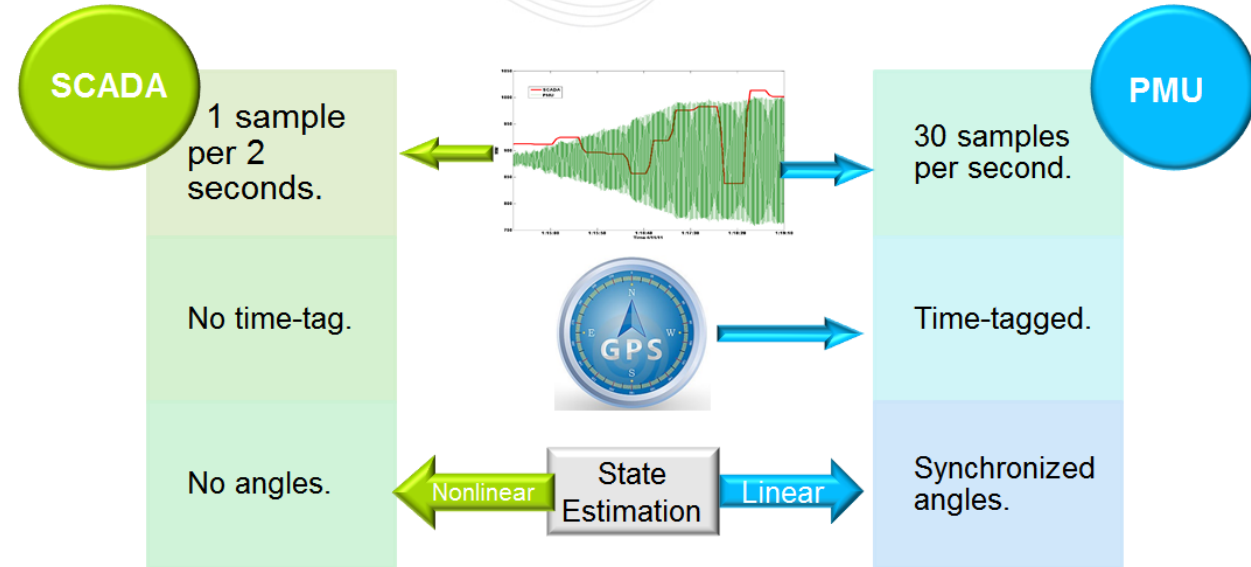
2018 PJM Synchronphasor Update

March 2018, OC
Shaun Murphy

- ✓ Simulator Based Operator Training
 - PMU Resilience
 - DIMA Visualization
 - TO Outreach Meetings
 - Improving PMU Data Quality

Training Outline

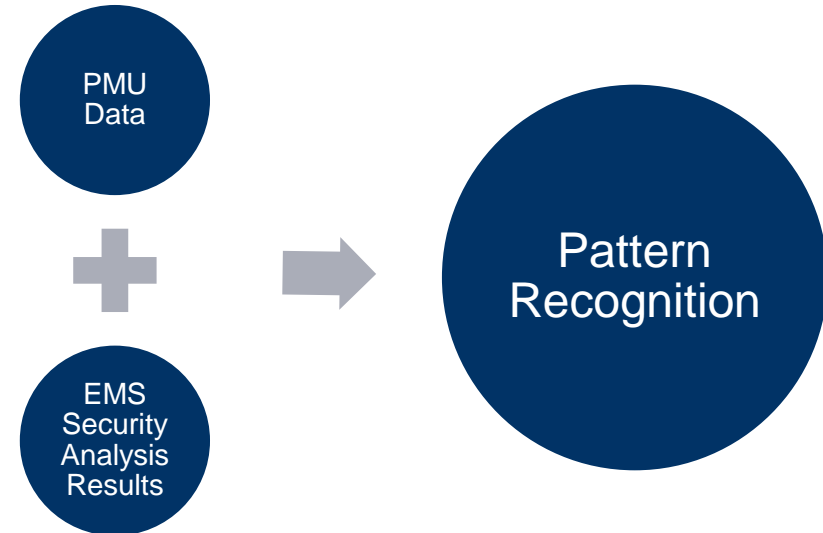
- Recap on Synchrophasors
- Recap on system oscillations
- Oscillation mitigation procedure in M03
- Using synchrophasor data to diagnose system oscillations:
 - Locating nearby PMUs (DIMAS)
 - Accessing PMU data (RTDMS)
 - Determine amplitude
 - Determine frequency
- Quiz
- Simulation
 - Surry oscillation
 - Island event



- Adjust north-south transfers
 - A. Increase north-to-south transfers
 - B. Decrease north-to-south transfers
- Adjust Surry voltage schedule
 - C. Raise voltage
 - D. Lower voltage
- Change system topology near Surry
 - E. Return transmission lines to service
 - F. Remove transmission lines from service
- Other
 - G. Increase load (pumps) at Bath County
 - H. Return PSS
 - I. Switch on 150 MVAR reactor at Clover
 - J. Trip Surry units



- PMU Team reviewing operational tasks performed by PJM that can be replicated or enhanced with Synchrophasors.
- Possible areas of exploration:
 - Intelligent islanding
 - IROL monitoring
 - Pseudo ACE
 - Data mining

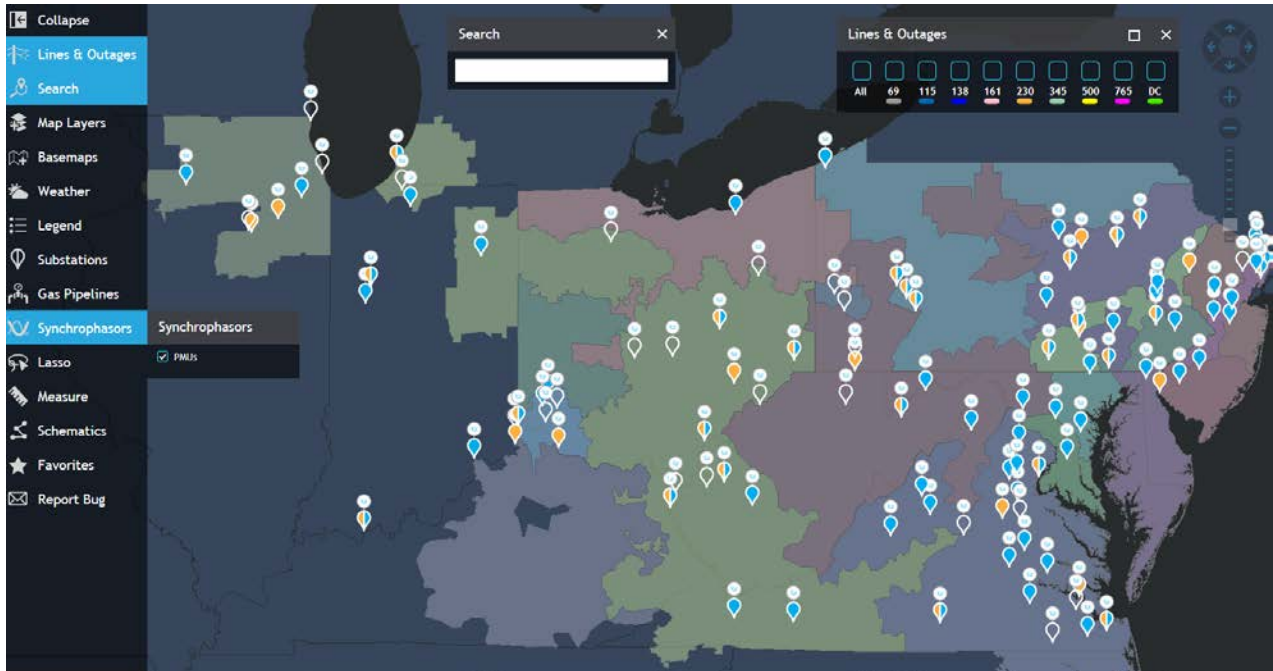


- The team is also reviewing the PMU IT infrastructure to further harden and improve networking and archive redundancy.

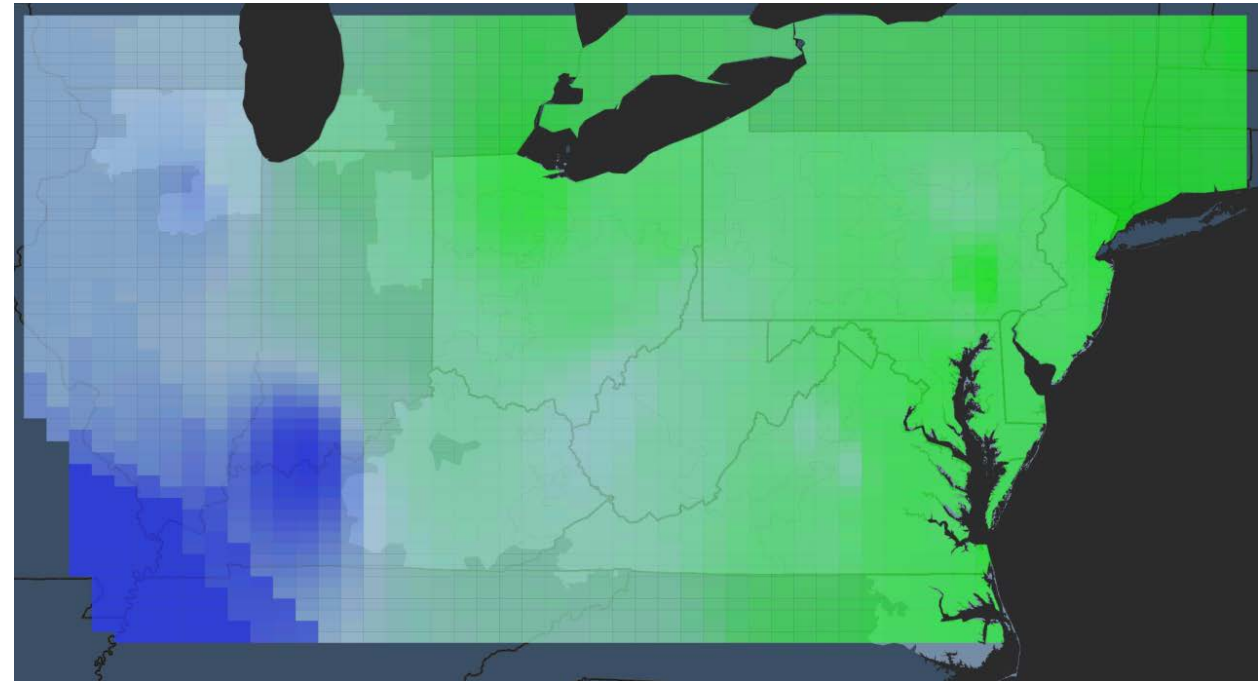
- PMU Location information added to DIMA in 2017

2018 plans include:

- Expanding PMU location information to external areas
- Data heatmaps



PMU Location Markers



Wide-area angle display

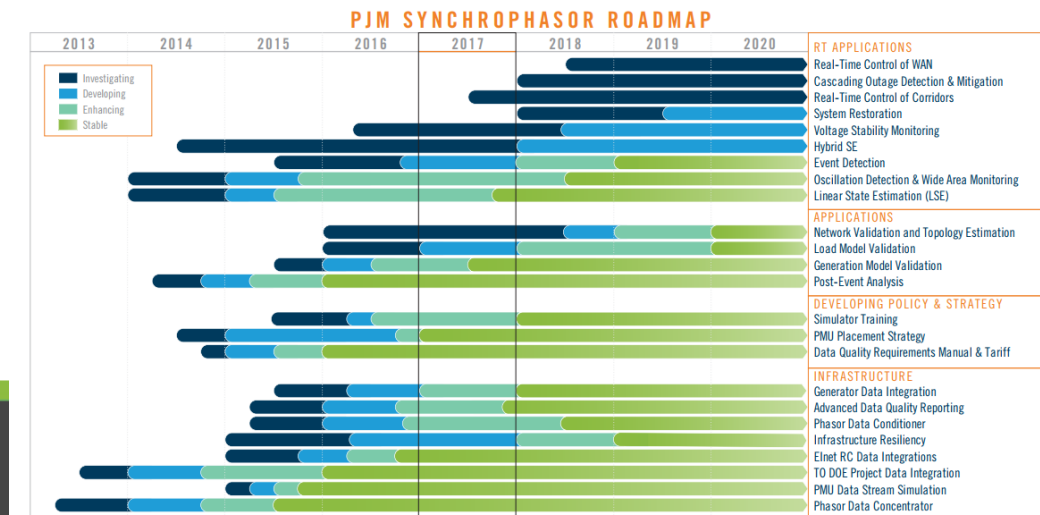
- Face to face meetings to:
 - Discuss PJM’s long term synchrophasor roadmap and vision
 - Learn about PMU developments at the Transmission Owner
 - Review PJM’s PMU Placement Strategy
 - Discuss open data quality issues
 - Update contact information

PJM Benefits

- Oscillation Detection
- Island Detection
- IROL backup

TO Benefits

- Generator model validation
- Asset health monitoring



- 2009 – PJM Phasor project begins
- December 2013 – Phasor Data Quality Task Force (PDQTF) established
 - Overall error rate - 14.35%
- February 2016 – Overall error rate down to 2.45%
- March 2016 – PDQTF Sunset into Data Management Subcommittee (DMS)

- Items for 2018:
 - Further refining data quality with DataNxt application
 - Improved tracking around PMU outage rates

