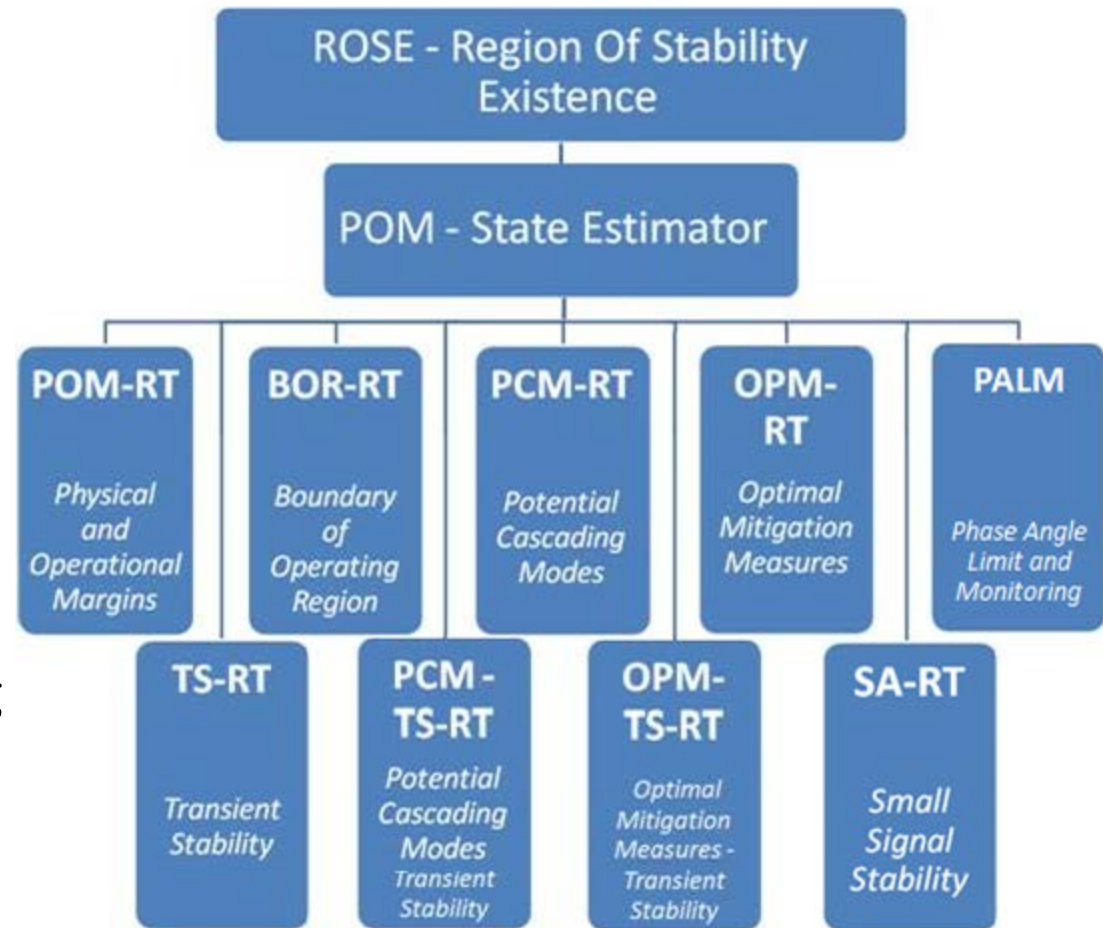# V&R Energy Solutions

Marianna Vaiman
NASPI Work Group Meeting
October 28-30, 2019
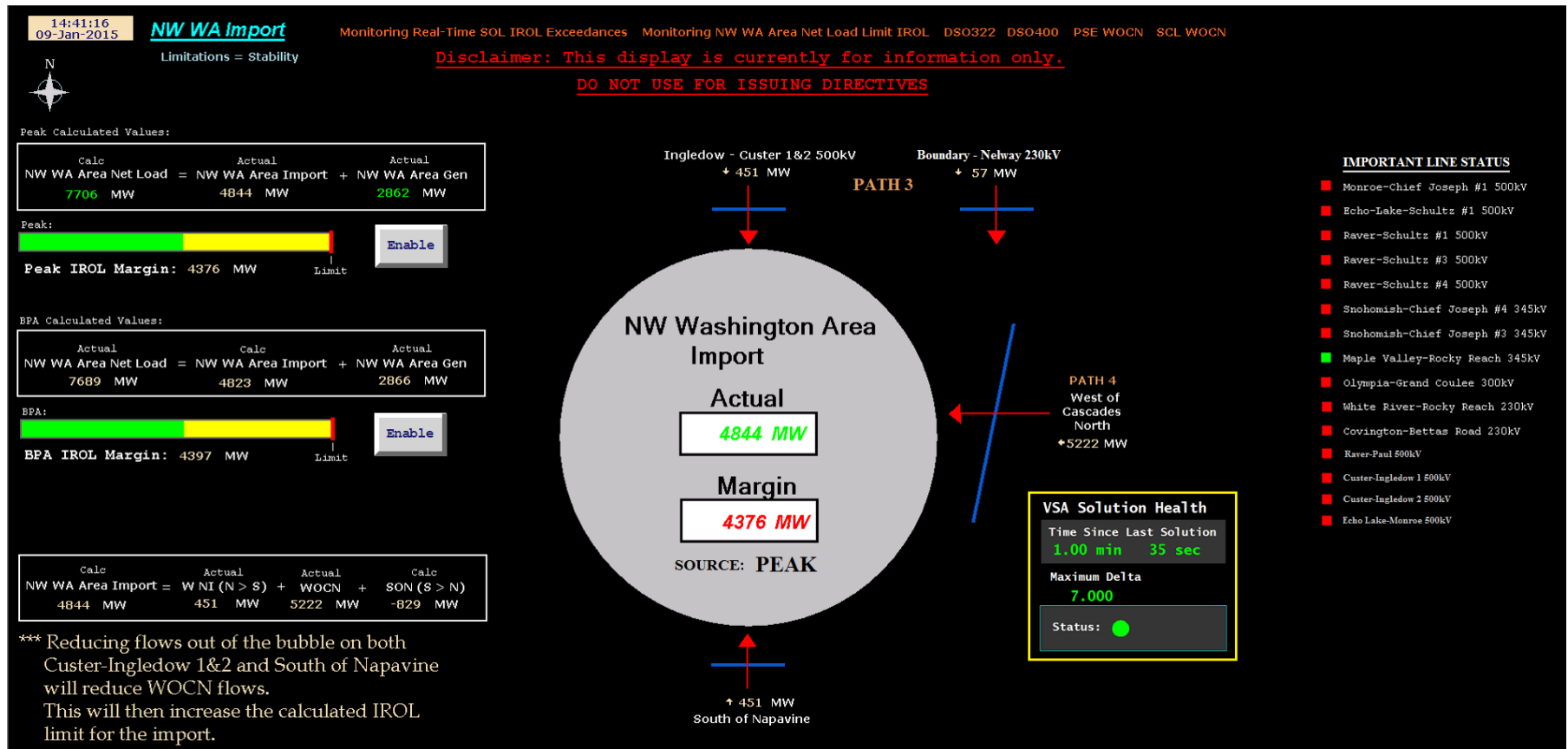
V&R Energy's Software Tools

- Used in planning, operations and real-time environments
  - POM Suite – long-term and operations planning analysis
  - ROSE software – real-time/on-line analysis
  - PMU ROSE – real-time PMU based software
  - D-PMU ROSE – real-time distribution system monitoring and analysis
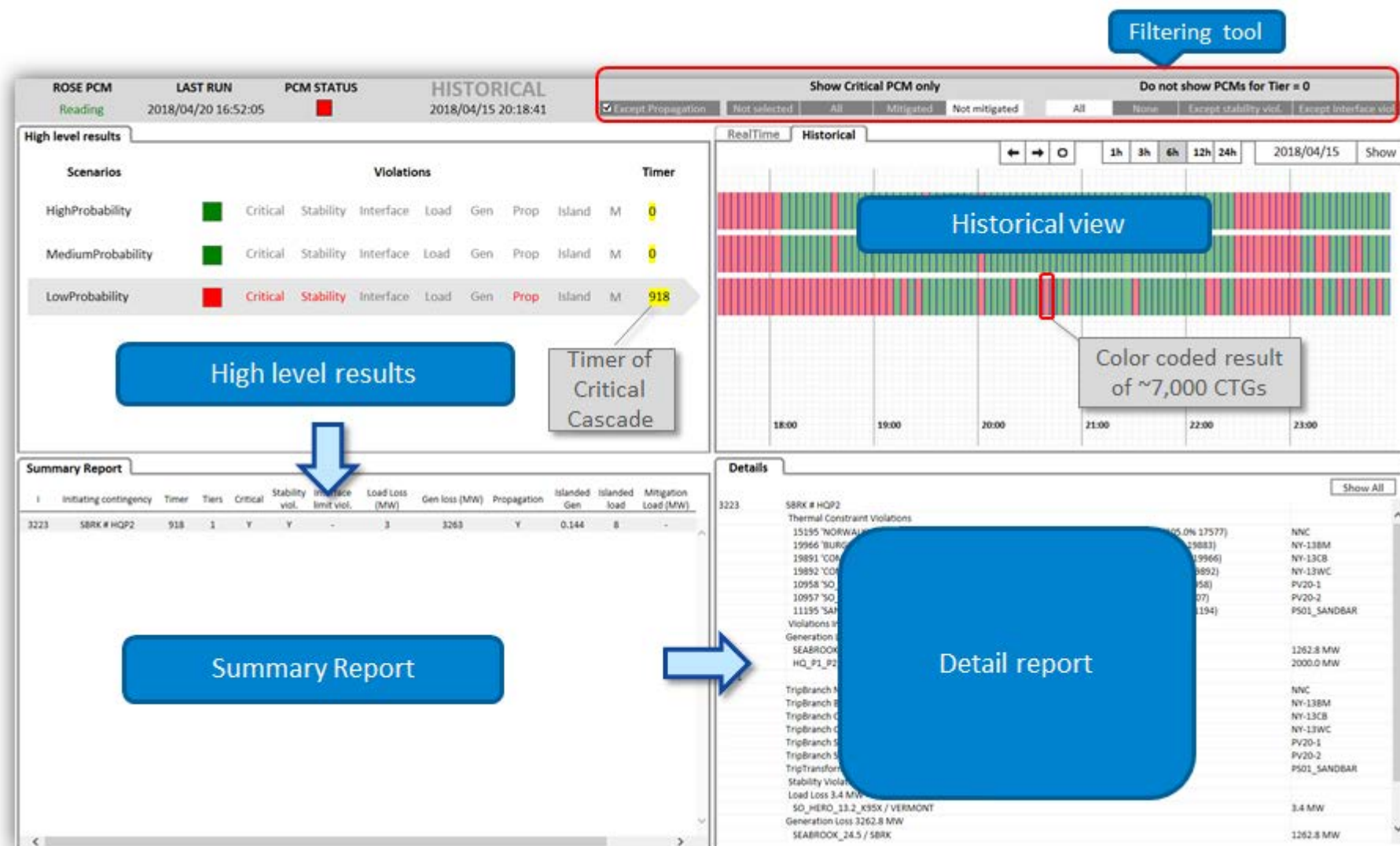
ROSE Platform for Online Advanced Apps

- Model-based, measurement-based & hybrid State Estimator
  - Can use V&R's SE or export from any EMS vendor
- Model-based and measurement-based analysis
- Integrated voltage and transient stability analyses
- Real-Time Phase Angle Limit computation and monitoring
- Boundary-based solution
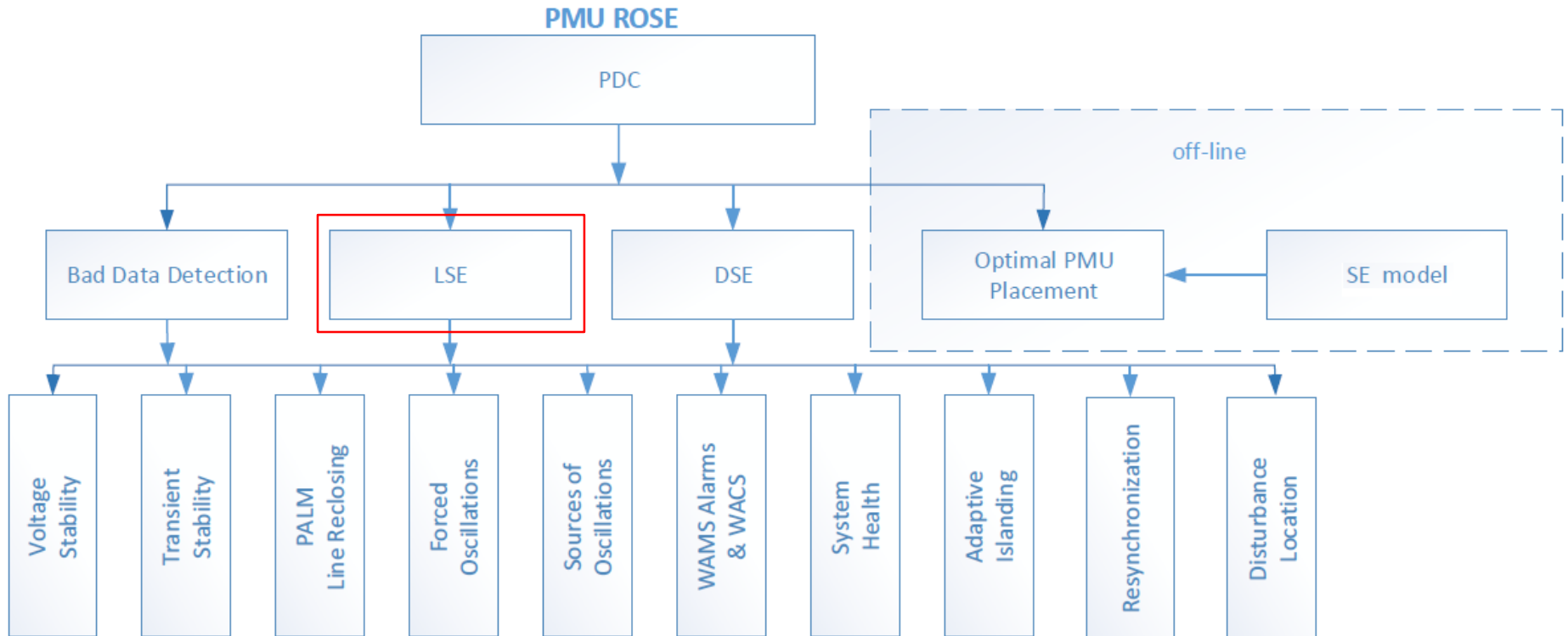- Automatic analysis of cascading outages
- Automatic remedial actions

ROSE-VSA at Peak

PEAKRELIABILITY
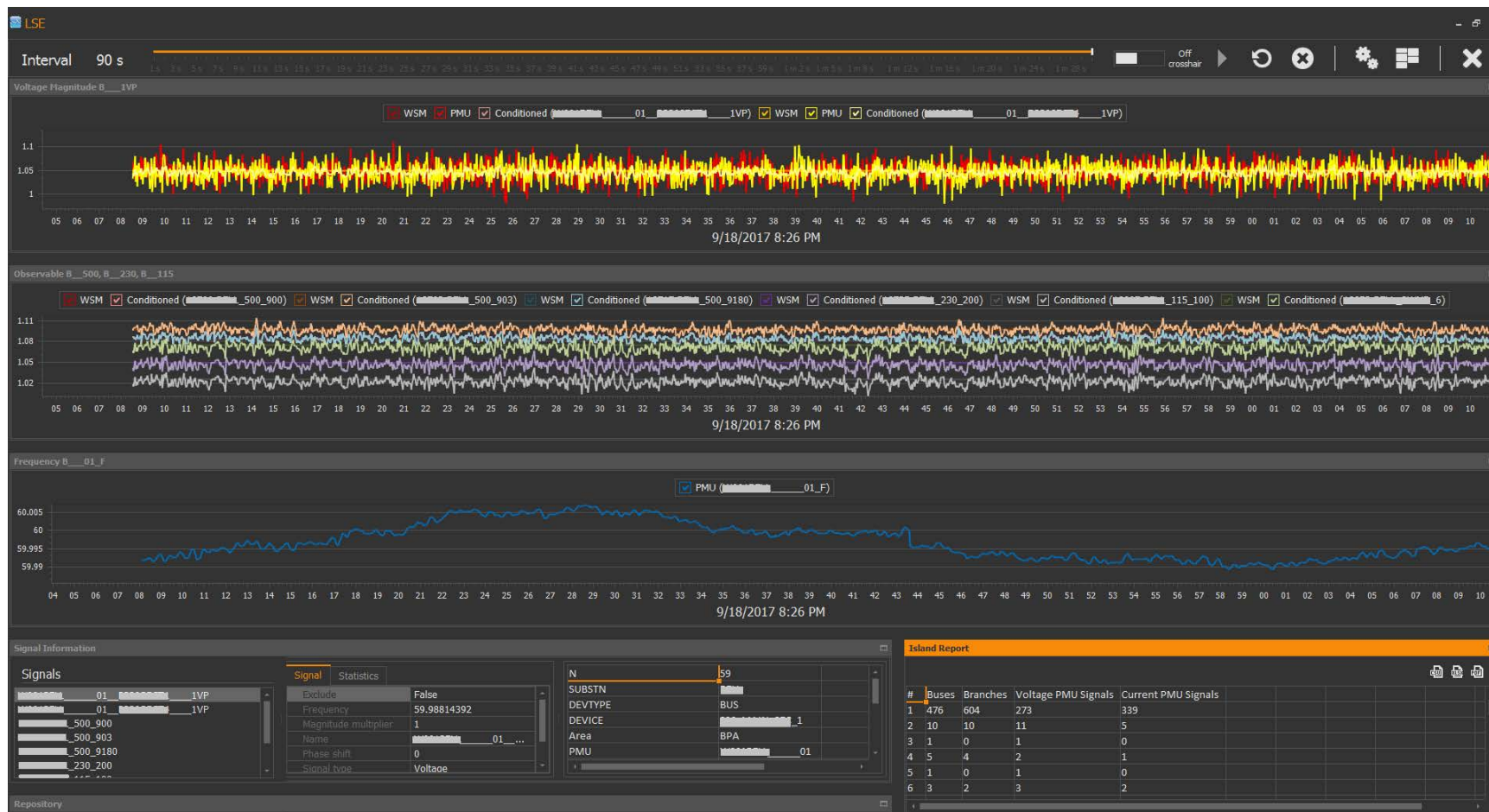
ISONE ROSE-PCM (Potential Cascading Modes)

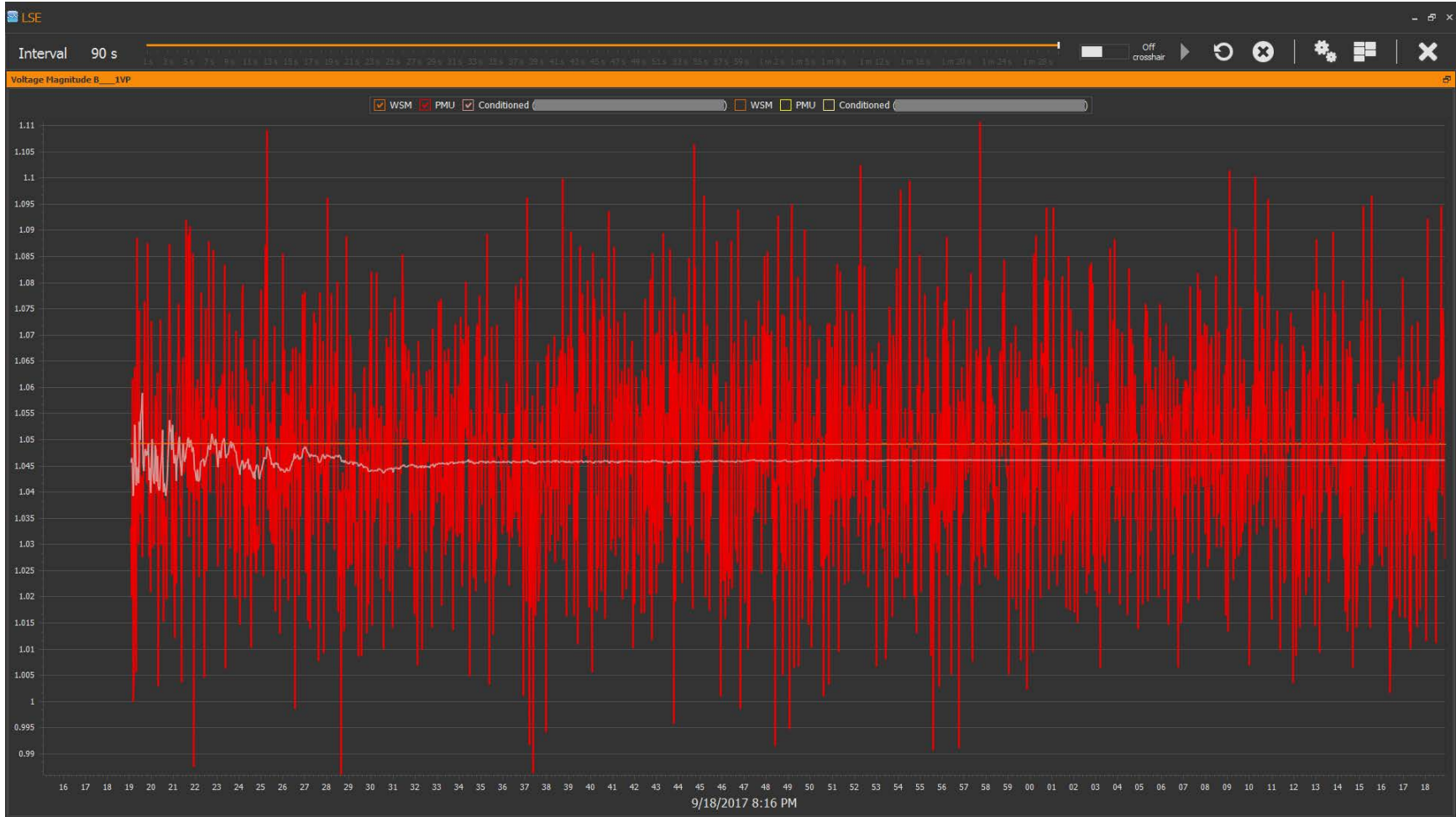# PMU-ROSE: Synchrophasor-Based Monitoring and Control Apps

PMU-ROSE LSE

- Provides the mechanism for selecting, viewing, and analyzing the input data and LSE result
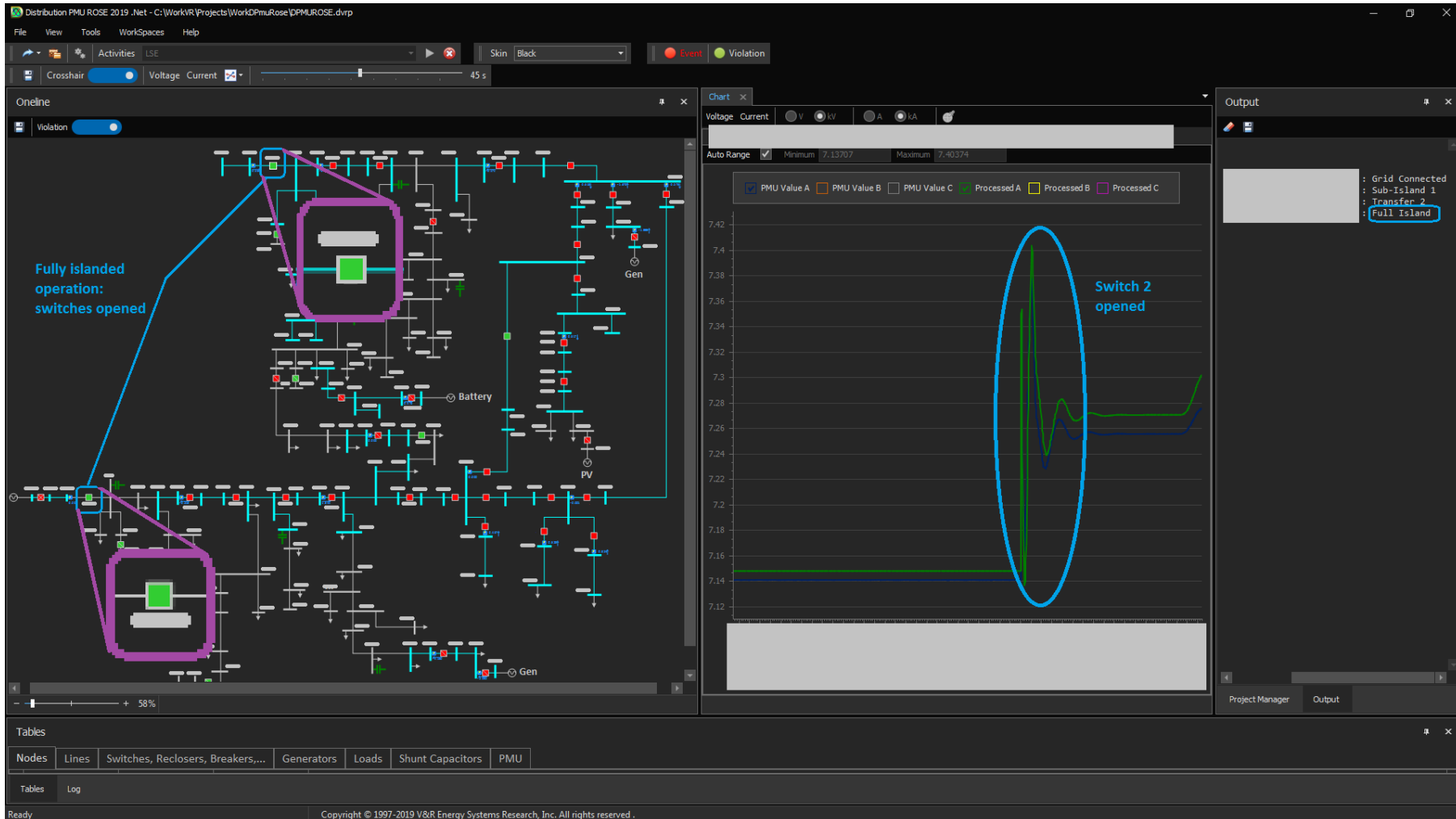
Machine Learning for LSE

Red graph –   PMU measurements

Pink graph –   LSE value with learning

Orange line –   State Estimator value

D-PMU ROSE

- D-LSE provides observability of distribution system and detects mode of microgrid operation

- D-LSE identified that the microgrid starts to operate in fully islanded mode