Focus on operationalizing Synchrophasor tools in Control room:

- **System Dynamic Limit Assessment & Frequency Responsive Measure Monitoring**
  - Operationalize online Transient Stability Analysis Tools (TSAT) in control rooms:
    - Validating the models and TSAT solutions against system events, implementing the new transient stability study criteria, and developing TSAT operating alarms/visualization and procedures

- **System Oscillation Monitoring, Forced Oscillation Detection and Source Location**:
  - Monitor inter area oscillation modes, detect forced oscillations and identify source units:
    - Baselining/correlation analysis study, sensitive contingency identification, and low damping mitigation control development and validation

- **Big Data Management and System Architecture** - Synchrophasor Handbook, PMU data mining analytics and system architecture for PMU data sharing and archiving/storage

- **Model Validation** - Identify system and power plant modeling issues by event simulation and PMU data
SMART WG Documents Shared with Peak Members via secured website of www.peakrc.org

• The SMART leadership team met bi-monthly to review and plan WG activities
• Typically each SMART taskforce holds its own monthly conference call on specific topics
• Peak SMART reports to WECC JSIS. Both have collaborative WG meetings twice a year
Progression in Oscillation Detection and Source Location

• Worked with WSU on forced oscillation detection software enhancement testing and the tool accuracy validating
• Improved oscillating unit locating toolset and deployed it to Prod (offline version) and Test environment (online and offline versions)
• Collaborated with BPA to complete a review of 2017 N-S Modes low damping events and identify the root causes
• Performed detailed study on BC Mode showing recurring low damping events and identified potential source units
Progression in Oscillation Detection and Source Location

- Build initial oscillation event alarms (to notify NetApps team only for now) to monitor N-S Modes closely in Prod/Test
- Started to use UTK-FNET/GridEye visualization tool for post-disturbance analysis on frequency/islanding events
- Worked with EPG to test and validate MAS2.0 software that is integrated into RTDMS product
- Created multiple study reports on forced oscillation events and source location findings. We shared the reports with the entities for further review and discussion
Ex. PMU Visualization of System Events

1-Islanding Event

2-Unit Tripping Event
Progression in Linear State Estimator Implementation

• Launched a Production project to implement EPG-eLSE tool. The tool is solving 30 sps with over 300 PMU in Dev/Test for LSE solution validation and software enhancement testing:
  o Includes both breaker and switch status measurements for topology process
  o Enables transformer tap changer modeling with tap measurements in eLSE
• Calculated Line/Path Flows and Phasor Angle Differences from raw PMU signals and downsampled them into EMS (viewable in SCADA or Grid Stability Assessment displays)
• Develop LSE solution visualization in PI-ESRI platform
Add LSE Overlays in PI-ESRI to Backup EMS/SE