

Scientific Tools for Advanced Synchrophasor Data Analysis

SciSync analytics

SciSync – Scientific Tools for Advanced Synchrophasor Data Analytics

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Overview

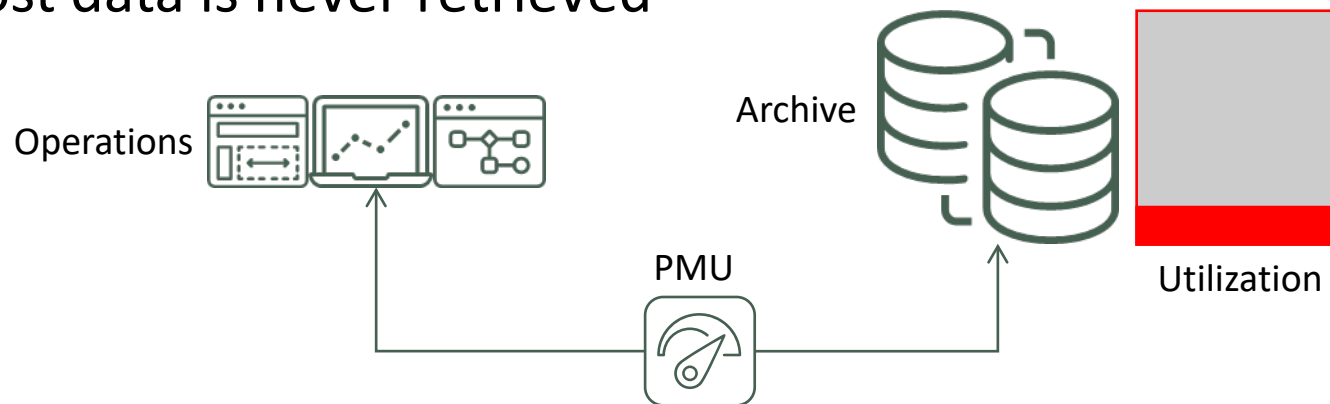
- Analyze Phasor Data – Common Challenges
- Archive Walker
- SciSync – Archive Walker 2.0
- Built in Algorithms – SciSync for Engineers
- Build New Algorithms – SciSync for Researchers
- Beta Testing for Utilities
- Conclusion

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Synchrophasor Archives are Underutilized

- Lots of real time application for Synchrophasors
- Lots of discussion on storage solutions
- What Then?
 - Data is stored for years
 - Some known events are used over and over
 - Most data is never retrieved

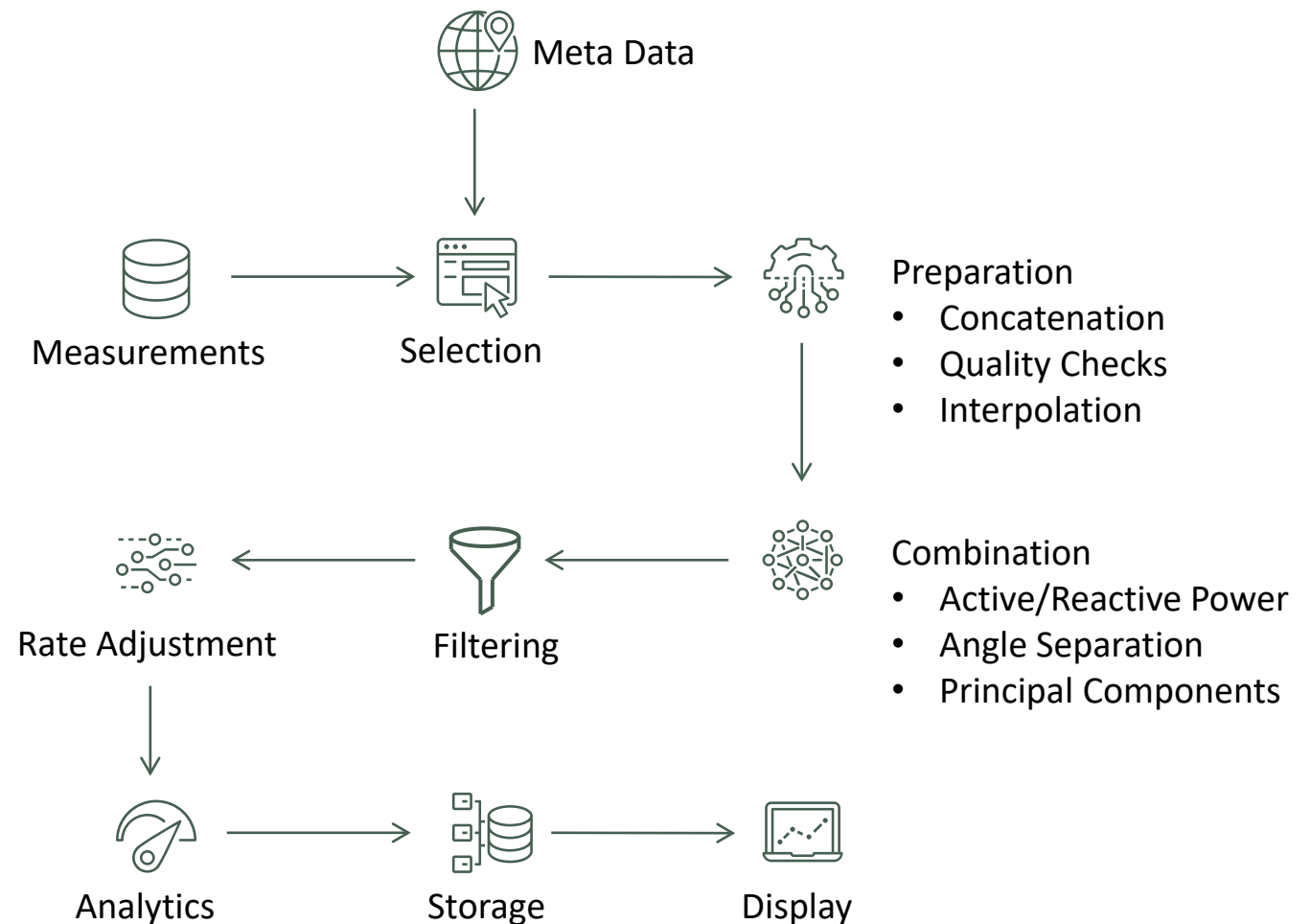


Unrealized Potential:

- Test new analytics
- Configure alarm thresholds
- Validate models
- Evaluate protection
- Analyze stability
- Review frequency response
- Develop operator training scenarios
- Monitor asset health
- Train machine learning models

Common Challenges

- Most tools offer little flexibility in the analysis chain
- The analysis chain makes developing custom tools difficult
- Large data volumes lead to long execution times
- Large data volumes are difficult to manage



Archive Walker

- Developed by PNNL for Bonneville Power Administration (BPA), 2016-2018
 - Identified oscillations
 - Identified voltage/frequency deviations
 - Analyzed wind power ramping
- Enhanced under U.S. Department of Energy (DOE) funding, 2018-2020
 - Tool for laboratory and field research
- Technology transfer to GPA under DOE's Technology Commercialization Fund, 2021-2023
 - Tool for utilities to analyze data from Synchrophasor archives



SciSync – Archive Walker 2.0

- Replicate the core functionality available in Archive Walker
- Engineering Desktop application
- Improvements over Archive Walker
 - Reduced execution time
 - Seamless integration with data sources
- Build extensible analytic framework allowing third parties to implement new algorithms
- Open-source publishing under the MIT License

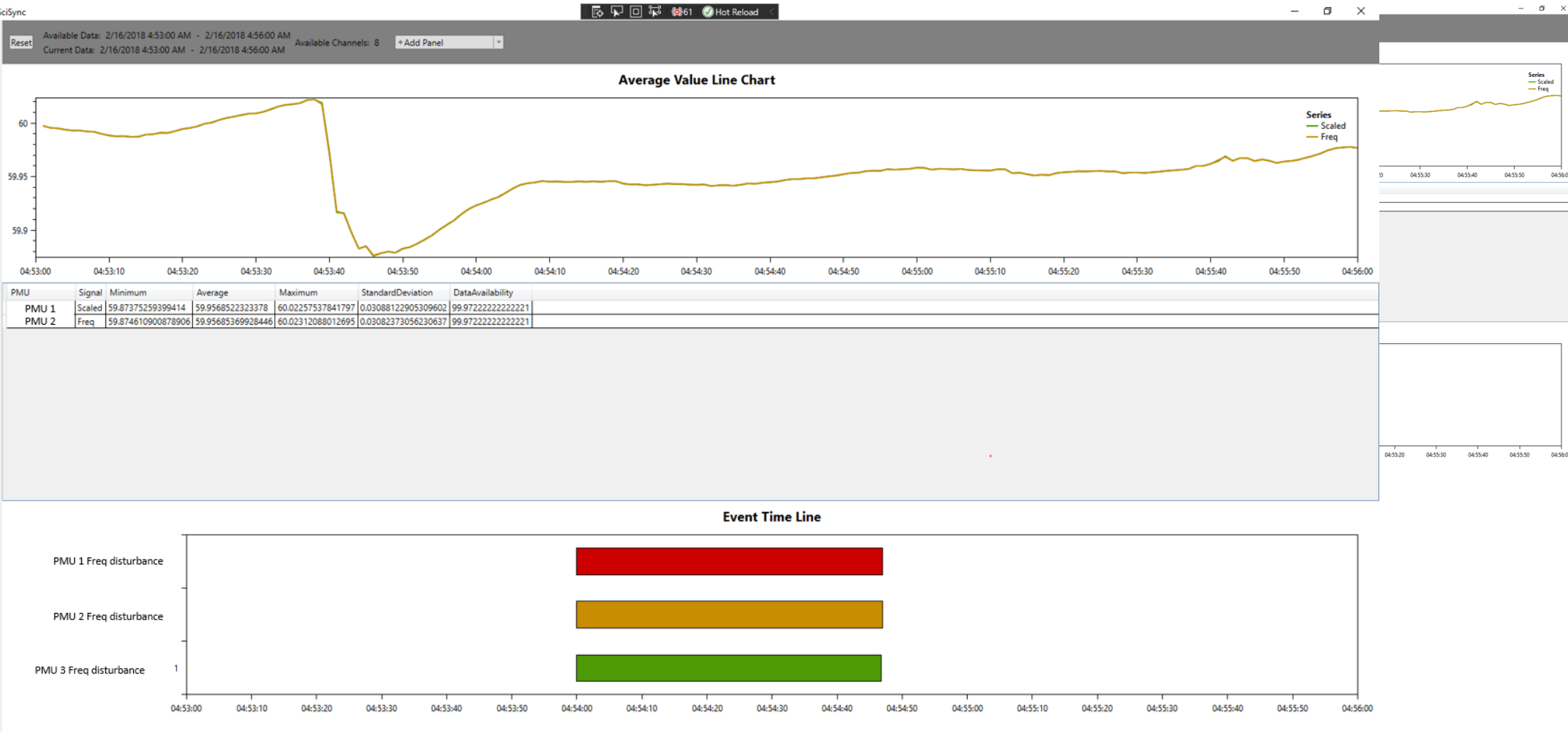
*open***Historian** 2
High-Performance Measurement Archive



OSIsoft.

Built in Algorithms – SciSync For Engineers

- Output
- Signal
- Condition
- Template
- Trajectory
- Window
- Device
- Forecast
- Source



Build New Algorithms – SciSync for Researchers

- Leverages existing Synchrophasor archiving infrastructure
- Provides flexible data analysis:
 - Short or long record lengths
 - Many or few channels
 - Known events or disturbance detection
- Enables offline tasks:
 - Model validation (NERC MOD-026-1 and MOD-027-1)
 - Frequency response analysis (NERC BAL-003-1)
 - Stability analysis (NERC IRO-002-6)
- Supports rapid prototyping
- Provides meta data as available for complex analytics

PNNL Test Environment

B O N N E V I L L E
P O W E R A D M I N I S T R A T I O N



Electricity Infrastructure Operations Center (EIOC)

Storage



Comparative Analysis

SciSync



Open Beta Testing

- GPA and PNNL to support Utilities targeted for Beta Testing
- Benefits for Beta Testing to utilities
 - GPA to provide no-cost support until 12/2022
 - OSISoft and GPA to closely work together for supporting customers with PI Systems
 - GPA and PNNL to provide custom “value added” webinar

Conclusion

- Synchrophasor archives are underutilized
- Utilities invested in data storage systems
 - Challenges to utilizing stored data remain
- SciSync provides support for analyzing historic synchrophasor data
- SciSync supports various data archive systems