PNNL-SA-172040

Pacific Northwest
NATIONAL LABORATORY

NASPI Update

April 12, 2022

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U.S. DEPARTMENT OF ENERGY BATTELLE

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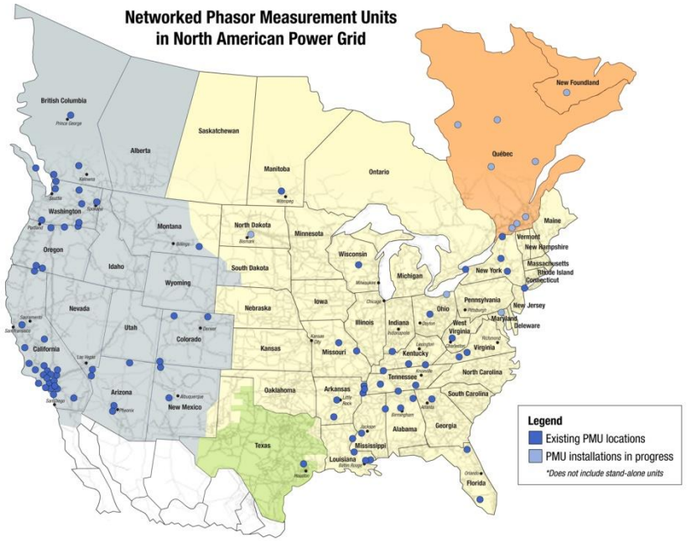
The North American SynchroPhasor Initiative (NASPI)

The U.S. Department of Energy (DOE) and EPRI are working together closely with industry to enable wide-area time-synchronized measurements that will enhance the reliability of the electric power grid through improved situational awareness and other applications.

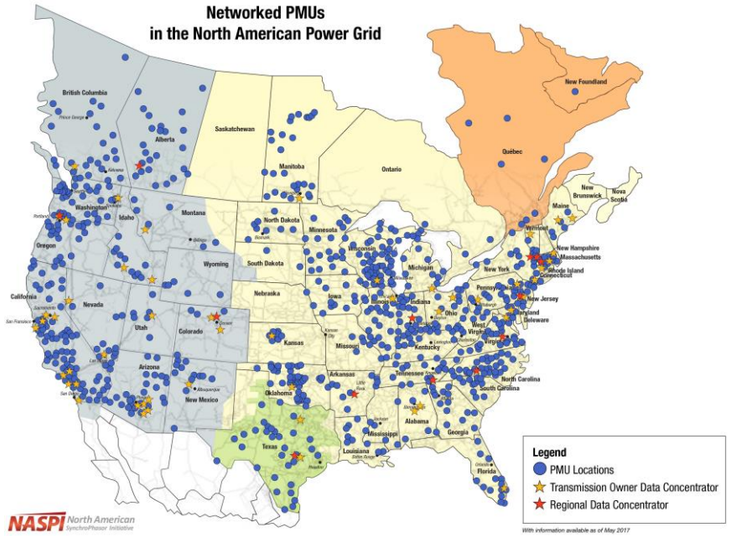
Current and emerging areas of emphasis/focus for NASPI:

- Networking and communications technologies (advanced architectures)
- Statistical analysis and deep learning for extracting actionable information from large datasets
- High-resolution sensors to characterize the transient behavior of inverter-based resources and other fast-acting phenomena

April 2007



May 2017



"Better information supports better - and faster - decisions."

NASPI Status Report

- Prior work group meeting – October 5-7, 2021
  - ✓ Big data analytics
  - ✓ Edge computing solutions
  - ✓ Measurements of inverter-based resources
  - ✓ Real-time simulators
  - ✓ Data sharing challenges
  - ✓ Control room applications
  - ✓ Oscillations
  - ✓ Inertia monitoring
- This work group meeting – April 12-14, 2022
  - ✓ Big data analysis
  - ✓ Real-time synchrophasor applications (including control room applications)
  - ✓ Oscillation mitigation
  - ✓ Data networking, architecture, archiving
  - ✓ High-speed waveform measurements
- Next work group meeting – October 18-20, 2022
  - Charlotte, NC

NASPI

Tuesday's Agenda – April 12

All Times Eastern Time Zone

Eastern Time	Tuesday, April 12, 2022
11:00 – 11:05 am	Welcome & Introductions: Jeff Dagle (PNNL)
11:05 – 11:20 am	NASPI Update – Jeff Dagle (15 minutes)
	Session # 1 – Big Data Analysis of Synchrophasor Data (FOA 1861) – Final Briefings
11:20 – 12:40 am	Session/Panel Moderator: Sandra Jenkins & Carol Painter - **(1 hr 20 mins)** Iowa State University, University of California – Riverside, and Texas A&M University (20 mins each + Q&A).
	Session # 2 – ESAMS Field Demonstration Update
12:40 – 1:00 pm	DOE-sponsored ESAMS Field Demonstration Update - Joe Eto
1:20 – 1:40 pm	PingThings Partner presentation from PingThings – Sean Murphy
1:40 – 2:10 pm	**Break - long**

Tuesday's Agenda – April 12 continued

All Times Eastern Time Zone

	Session # 3 – Use of Real-time Synchrophasor Applications
2:10 – 2:30 pm	AEP's WAMS Experiences with Synchrophasor Applications - Yuan Kong (American Electric Power)
2:30 – 2:50 pm	WAMS Applications for The Control Room of The Future by Using Next Generation Grid Operations Framework - Jan Vit Suntar (DNV Energy Systems)
2:50 – 3:10 pm	Generation Loss Source Location for Grid Operations with Synchrophasor Data - Jared Bestebreur (Schweitzer Engineering Laboratories, Inc.)
3:10 – 3:30 pm	WAMS Dynamic Real Time System Simulator - Janio Leonardo Los, Arthur do Carmo Mouco, & Hector Andres Rodriguez Volskis (ONS - Operador nacional do Sistema Elétrico Brasileiro)
3:30 – 3:50 pm	Dominion Energy's Pilot Deployment and Evaluation of enhanced Linear State Estimator for Grid Resiliency - Backer Abu-Jaradeh (Electric Power Group)
3:50 – 4:10 pm	Partner presentation from V&R Energy
	Session #4 Application and utilization of distribution state estimation
4:10 – 4:30 pm	DER Gateway to Support Real-Time Control and Situational Awareness in Distribution Grids - Chad Abbey (Quanta Technology)

Wednesday's Agenda – April 13

All Times Eastern Time Zone

Eastern Time	Wednesday, April 13, 2022
11:00 – 11:05 am	Welcome & Agenda Review: Jeff Dagle (PNNL)
	Session # 5 – Extracting actionable information from synchrophasor data and
11:05 – 11:25 pm	An Integrated Generative Adversarial Network for Identification and Mitigation of Cyber-Attacks in Wide-Area Control - Jishnudeep Kar (North Carolina State University)
11:25 – 11:45 pm	Synchronous Phase Angle Measurement Using Smart Meters - David Rieken (Hubbell Inc.)
11:45 – 12:05 pm	Swedish Railway Improves Energy Efficiency with PMU and Time Synchronization - Werner Abt (Meinberg-USA)
12:05 – 12:25 pm	High-speed Data Measurements of The Raw Data for Root-Cause Analysis and Data Management - Manko Ho (IBA America)
12:25 – 12:30 pm	Break
	Session # 6 - Use of real-time synchrophasor applications, continued
12:30 – 12:50 pm	Scientific Tools for Advanced Synchrophasor Data Analytics (SciSync) - Christoph Lackner (Grid Protection Alliance)
12:50 – 1:10 pm	Real-Time System Inertia Monitoring – Michael Cassiadoro (Total Reliability Solutions LLC) and Chris Kimmett (Reactive Technologies)
1:10 – 1:30 pm	Locating Faults in Large Power Grids Using A Few Strategically Placed PMU Measurements - Ali Abur (Northeaster University)
1:30 – 1:50 pm	How to Improve Grid Resiliency by Connecting Analytics & Operations - Hazel Gurule and Gilburt Chiang (Palantir Technologies)
1:50 – 2:10 pm	IEEE SA STANDARDS ASSOCIATION PMU Certification Program - Elizabeth Okutuga (IEEE)
2:10 – 2:45 pm	**Break - long**
	Session # 7 – NASPI Task Team Updates (email naspi.pnnl.gov to get involved)
2:45 – 2:55 pm	CRSTT Update (10 minutes)
2:55 – 3:05 pm	DNMTT Update (10 minutes)
3:05 – 3:15 pm	DisTT Update (10 minutes)
3:15 – 3:25 pm	EATT Update (10 minutes)
3:25 – 3:35 pm	PRSVTT Update (10 minutes)
	Session # 8 - Oscillation mitigation, including specifically inverter-based resources
3:35 – 3:55 pm	Fast Oscillation Detection and Labeling via Coarse-Grained Time Series Data for ML Applications - Xin Xu (Dominion Energy)
3:55 – 4:15 pm	Forced Oscillation Grid Vulnerability Analysis: Texas Grid Case Study - Khaled Alshuaibi (University of Tennessee)
4:15 – 4:35 pm	Stabilizing Transient Disturbances with Utility-Scale Energy Storage Systems - Ryan Elliott (Sandia National Laboratories)
4:35 – 4:55 pm	OSCILLOQUARTZ An ADVA Company Achieving Resilient and Assured PNT in Secure Smart Grids - Nino De Falcis
	NASPI Work Group Reception
4:55 – 5:30 pm	**Please join us for the NASPI Reception in the main meeting room**

Thursday's Agenda – April 14

All Times Eastern Time Zone

Eastern Time	Thursday, April 14, 2022
11:00 – 11:05 am	Welcome & Agenda Review: Jeff Dagle (PNNL)
	Session # 9 – Control Room Application Panel
11:05 – 12:05 pm	CRSTT Panel – Control Room Applications (1 hour) Panel Moderator: James Kleitsch ○ Dominion - Lang Chen will discuss what they are doing to roll out the technology to their operations. ○ SRP- Matthew Rhodes will discuss what SRP has done to pave the way for the rollout of the technology to their control room this year. ○ CAISO – Aftab Alam will discuss oscillation and angle monitoring and other tools they are looking at implementing.
	○ AESO - Murray Mueller will provide an update on what they are doing with the technology to support real time operations.
	Session # 10 - Experience with synchrophasor data networking, architecture, archiving
12:05 – 12:25 pm	Synchrophasor Data Storage and Compression Experience and Improvements at MISO - Brian Kiefer (MISO Energy)
12:25 – 12:45 pm	Lessons Learned at Scale with the World's Largest STTP Deployment for Synchrophasors – Sean Murphy (PingThings)
12:45 – 1:05 pm	SEL SCHWEITZER ENGINEERING LABORATORIES Partner Presentation - Jared Bestebreur
	Session # 11 – Organization Reports from NASPI-Related Activities (10 minutes ea.)
1:05 – 1:15 pm	NERC Synchronized Measurement Working Group (SMWG) update: Tim Fritch (TVA)
1:15 – 1:25 pm	EIDSN update – Kent Simendinger (MISO)
1:25 – 1:35 pm	IEEE update: Allen Goldstein (NIST)
1:35 – 2:10 pm	**Break - long**
	Session # 12 – High-Speed Waveform Measurements: Applications and Instrumentation
2:10 – 2:30 pm	A Power Grid Anomaly Detection Algorithm with Point on Wave Data Recording - He Yin (University of Tennessee)
2:30 – 2:50 pm	Performance and Applications of Synchronized Waveform Data Compression - Steven Blair (Synaptec)
2:50 – 3:10 pm	GridSweep: Active Measurements of Electric Distribution Systems – Sascha von Meier (UC Berkeley and Lawrence Berkeley National Laboratory)
	Session #13 - Understanding measurement uncertainty relating to power system oscillation mitigation
3:10 – 3:30 pm	Field Implementation of Wide-area Damping Control System in Large-scale Power Grids - Yi Zhao (University of Tennessee)
	Session # 14 - Extracting actionable information from synchrophasor data to support either real-time or engineering applications
3:30 – 3:50 pm	Analysis of STATCOM Oscillations using Ambient Synchrophasor Data in Dominion Energy - Chetan Mishra (Dominion Energy)
3:50 – 4:10 pm	Analysis of Low Voltage ride through capability of Photovoltaic solar generation using synchrophasors - Aman Gautam (Power Systems Operation Corp.)
4:10 – 4:30 pm	Evolving Synchrophasor Data Network Architectures to Support Wide-Area Control – Dexin Wang (Pacific Northwest National Laboratory)
4:30 – 4:50 pm	Detection of Induced and Resonance Voltage phenomenon using PMU data in real time system operation and mitigation measures - Minnakuri Venkateswara Rao (Power System Operation Corporation Limited, India)
4:50 – 5:10 pm	Voltage Transformer Failure Prediction With Synchrophasor Data - Md Arif Khan (Schweitzer Engineering Laboratories, Inc.) and Matthew Rhodes (SRP)

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Thank you, NASPI Partners, for your continued support

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U.S. DEPARTMENT OF ENERGY | Pacific Northwest NATIONAL LABORATORY | EPRI ELECTRIC POWER RESEARCH INSTITUTE

NASPI 2022 Webinar Series

- January 26 – Synchronized Waveforms – A Frontier of Data-Based Power System and Apparatus Monitoring, Protection, and Control - Wilsun Xu
- February 23 – Applications of Time Synchronized Measurements in the Electric Grid - Mohini Bariya
- March 30 - Impacts of Forced Oscillations - Aftab Alam and Urmila Agrawal
- June: Success Stories – SDG&E
- July: Workforce Development – University leadership panel
- August: Machine Learning State Estimation – EPRI
- September: Telemetry for IBR disturbance monitoring and analysis (lead in to fall workshop)

All webinar materials are available at www.naspi.org/webinars

The NASPI Technical Task Teams

- Control Room Solutions
  - Jim Kleitsch
  - Cody Parker
- Data & Network Management
  - Dan Brancaccio
- Distribution
  - Sascha von Meier
  - Dan Dietmeyer
- Engineering Analysis
  - Evangelos Farantatos
  - Matthew Rhodes
- Performance Requirements, Standards & Verification
  - Jim O’Brien
  - Farnoosh Rahmatian

NASPI Path Forward

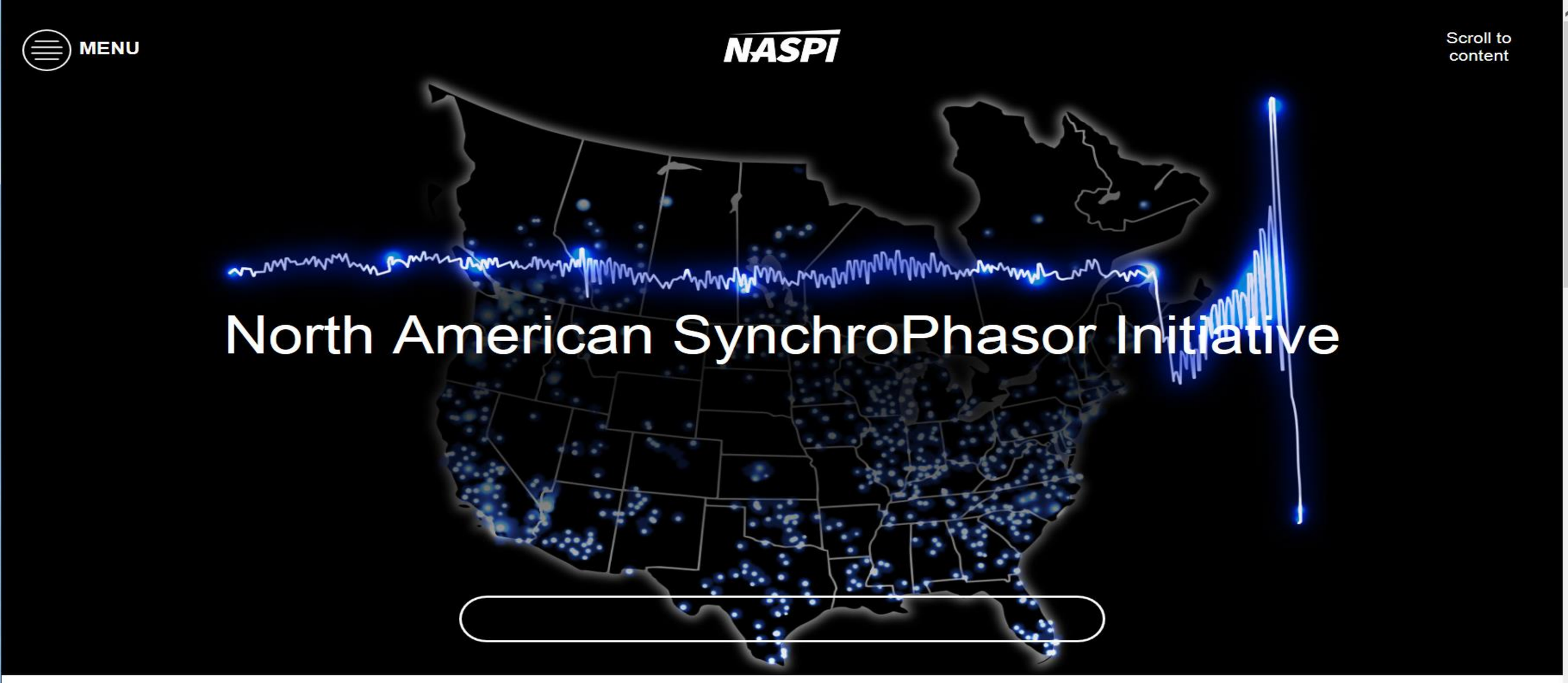
- Continue to support and liaison with industry
  - Various IEEE Standards activities
  - North American Electric Reliability Corporation
    - ✓ Synchronized Measurement Working Group
  - Western Electricity Coordinating Council
    - ✓ Joint Synchronized Information Subcommittee
- Anticipating no substantial structural changes to the NASPI leadership team, industry-led task teams, or meeting tempo (plan to resume twice per year)
  - Maintain approximately equal representation among utilities, vendors, and academia, which has been a unique attribute and key value proposition for NASPI
- Current and emerging areas of emphasis/focus for NASPI:
  - Networking and communications technologies (advanced architectures)
  - Statistical analysis and deep learning for extracting actionable information from large datasets
  - High-resolution sensors to characterize the transient behavior of inverter-based resources and other fast-acting phenomena

Save the Date

The next NASPI Work Group Meeting will be held:

October 18-20, 2022

Location: Charlotte, NC



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Thank you