



PNNL-SA-215425

North American SynchroPhasor Initiative (NASPI) History

September 23, 2025

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PNNL is operated by Battelle for the U.S. Department of Energy

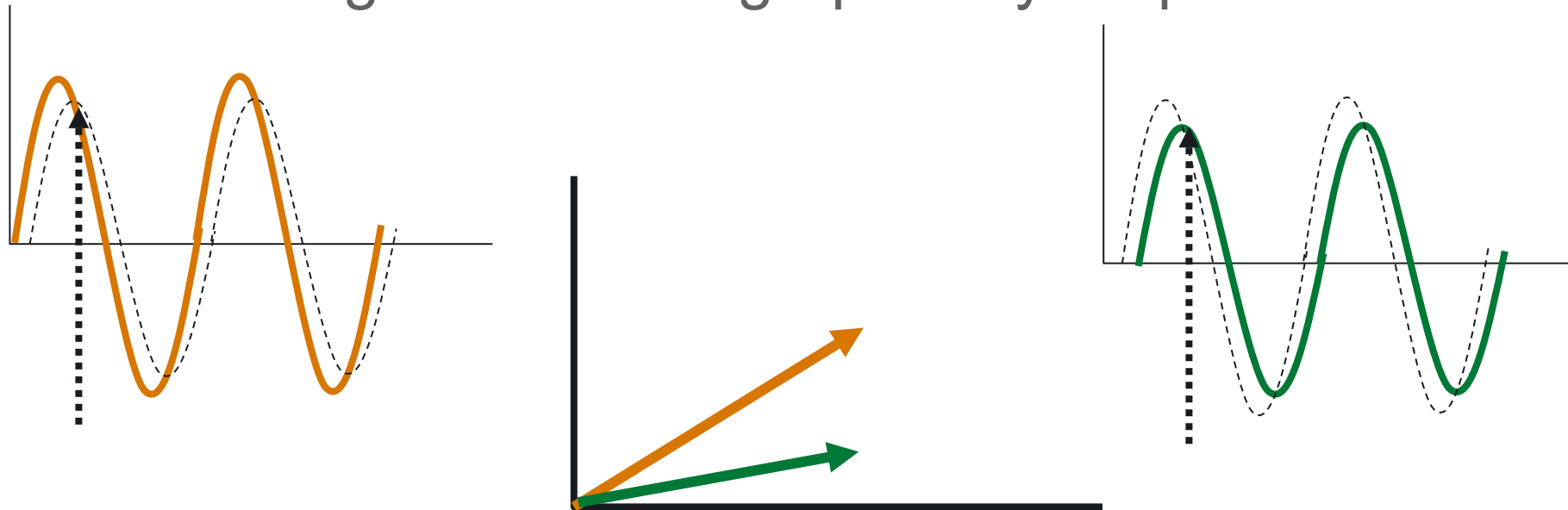


Substation A

Substation B

← ... at different locations ... →

- Relative Phase Angle From Geographically Dispersed Locations



By synchronizing the sampling processes for different signals - which may be hundreds of miles apart, it is possible to put their phasors on the same phasor diagram.

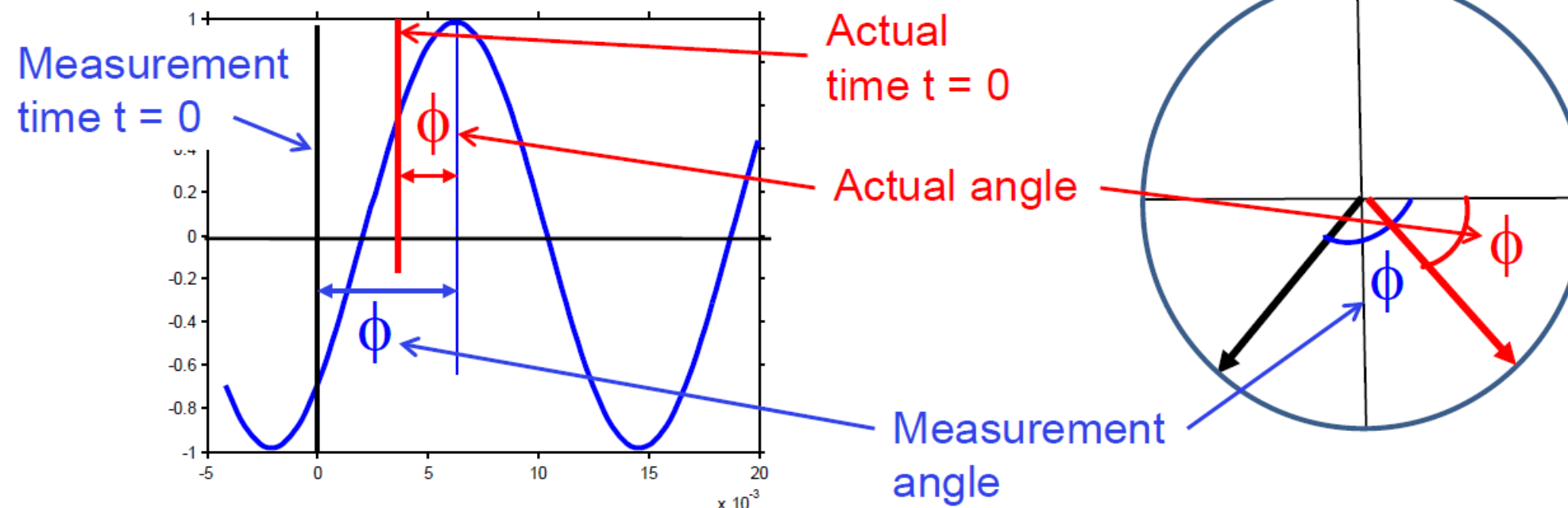
Credit: A.G. Phadke

Time Accuracy Requirement

- The phase angle is determined by the time reference
- If $t = 0$ is displaced by x seconds, the phase angle will be rotated by $x/46 \times 10^{-06}$ degrees ($1^\circ \sim 46 \mu\text{s}$ at $f_0 = 60 \text{ Hz}$)
- Note the error ONLY effects phase angle – magnitude ok

$$v(t) = \sqrt{2} A \cos (2 \pi \omega_0 t + \phi)$$

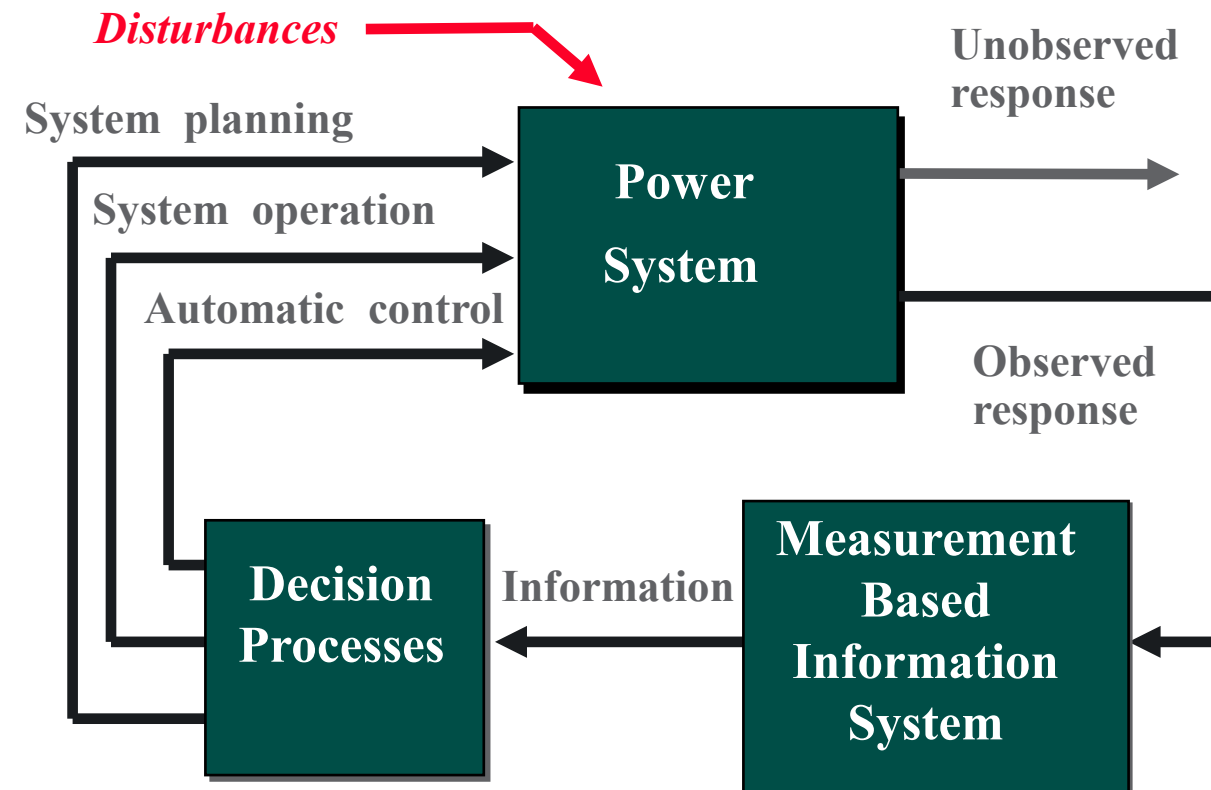
$$V = A e^{j\phi}$$



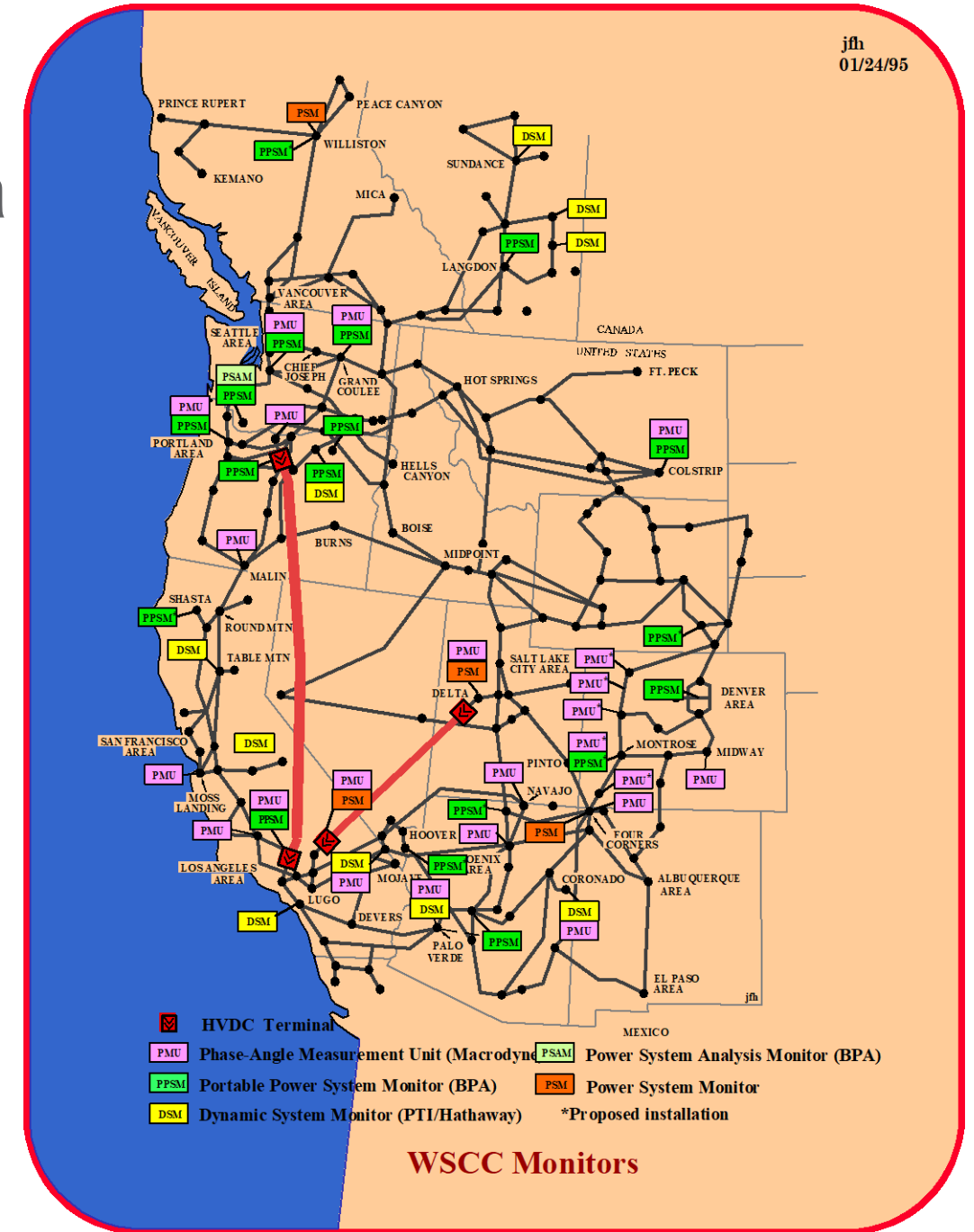
Credit: K. Martin

Early Experience Deploying WAMS in the Western Power System

- The benefit of sharing measurement data awareness and analysis



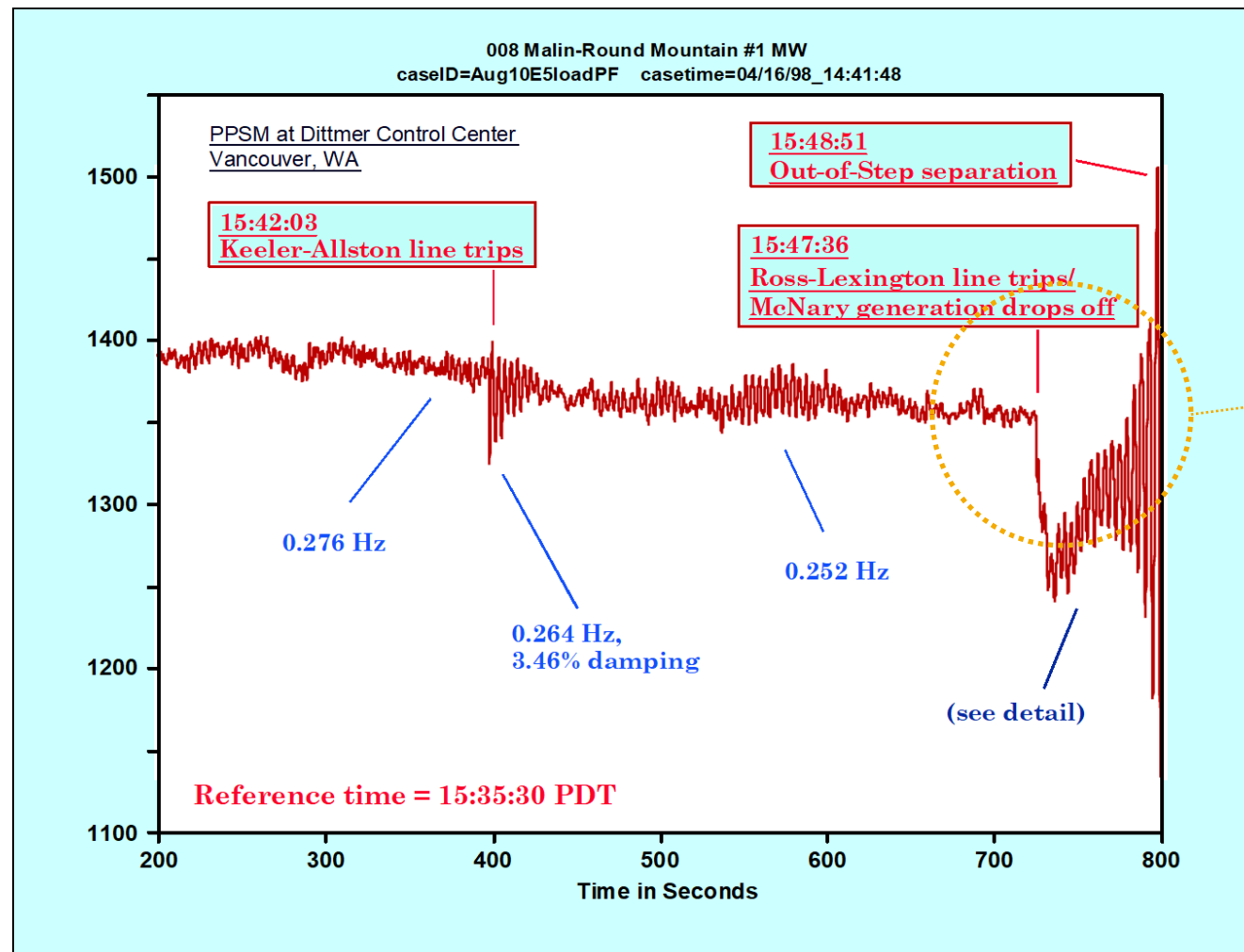
“Better information supports better - and faster - decisions.”



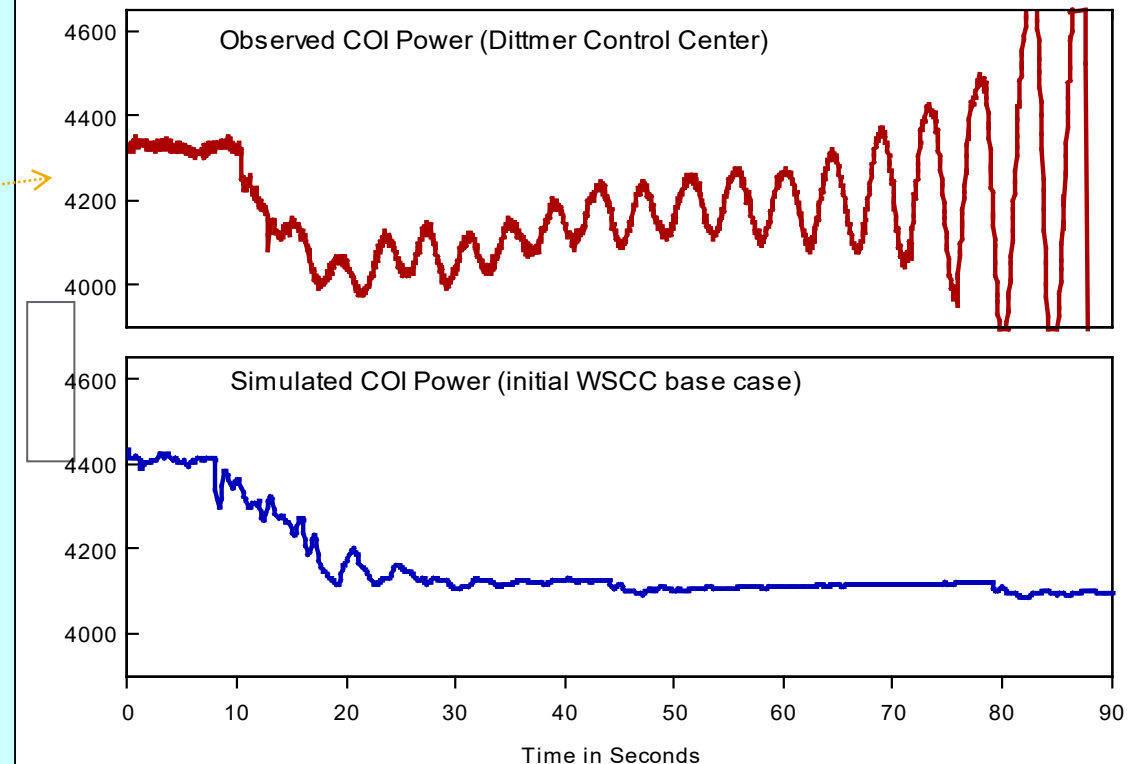
Credit: J. Hauer

The need for dynamic model validation was reinforced after the August 10, 1996 blackout

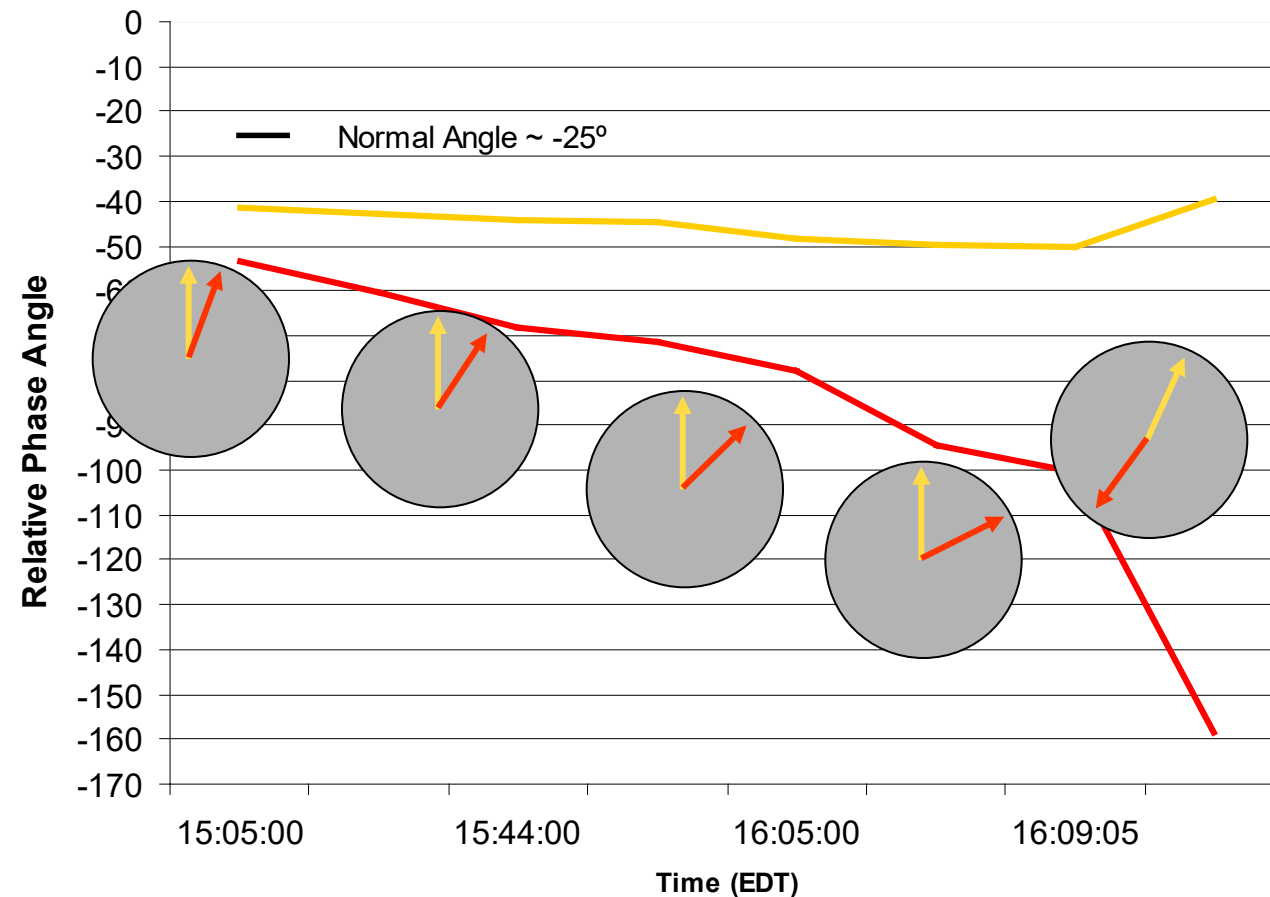
- One of the earliest “killer apps” of wide-area measurements...



Better Models Were Needed!

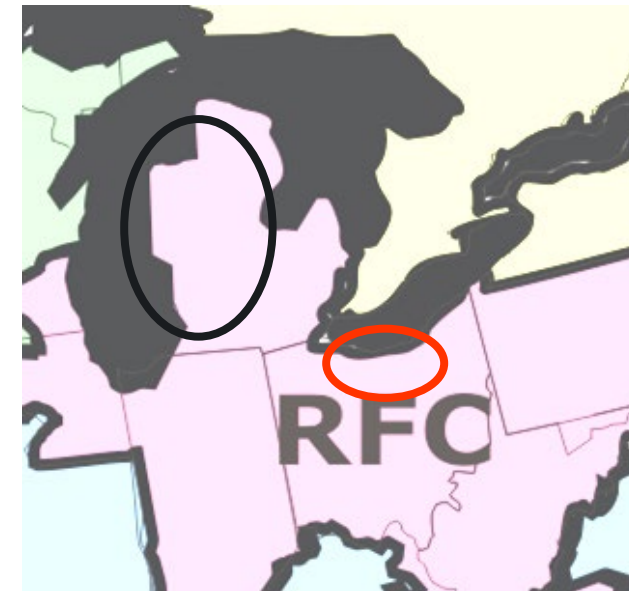


Wide-area situational awareness was a key finding associated with the August 14, 2003 Blackout



Reference:
Browns
Ferry

Cleveland West MI



Slide Credit:
North American
Electric Reliability
Corporation (NERC)

DOE Programmatic Support

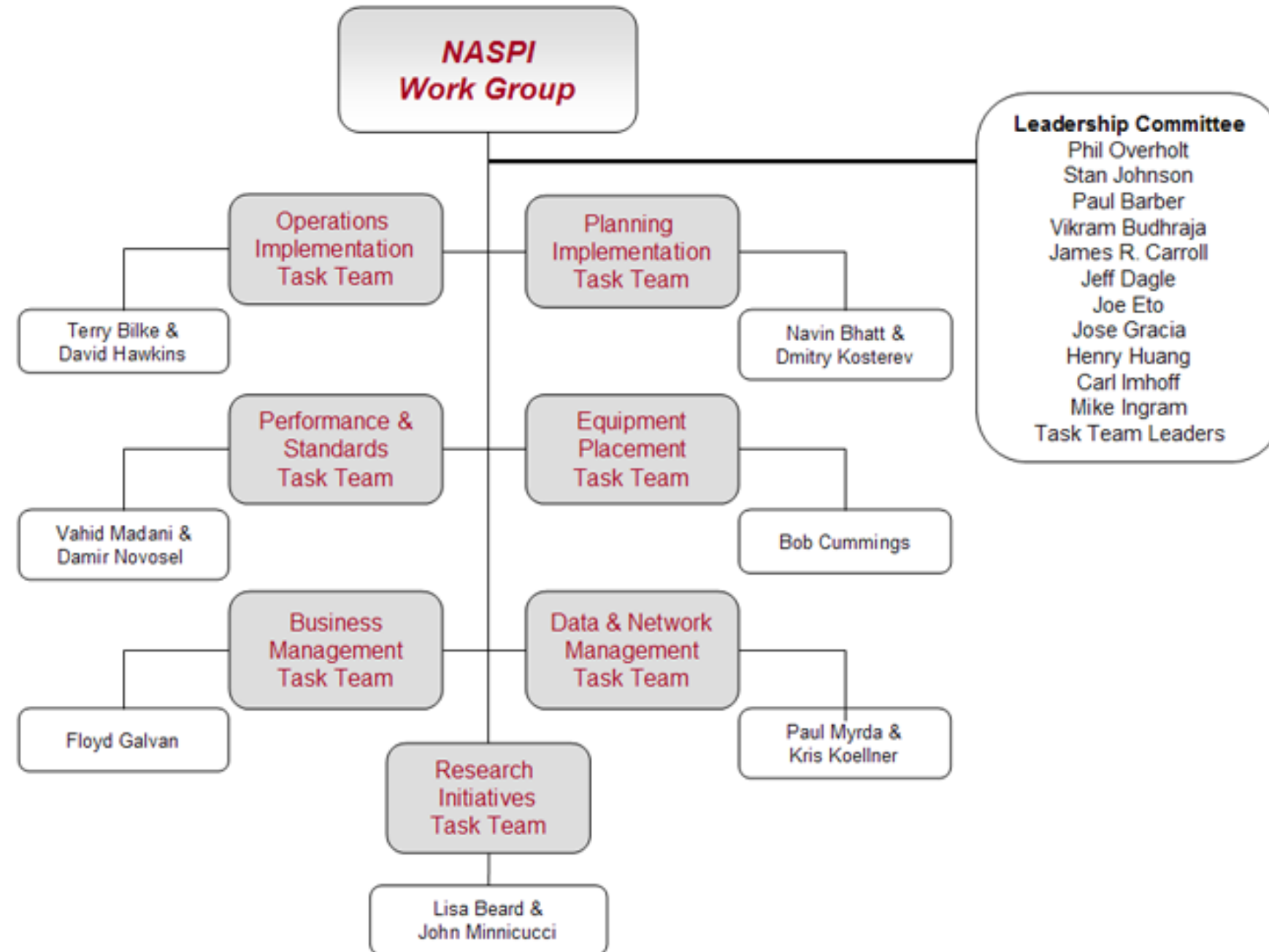
- Consortium for Electric Reliability Technology Solutions (CERTS)
- Eastern Interconnection Phasor Project (EIPP)
- North American SynchroPhasor Initiative (NASPI)
- American Recovery and Reinvestment Act (ARRA)
 - Smart Grid Investment Grants
- Grid Modernization Initiative
- Office of Electricity: Grid Controls and Communications Division

NASPI “Pioneers”

Recognized at the inaugural NASPI Work Group meeting May 9, 2007:

- Mark Adamiak
- Bharat Bhargava
- John Hauer
- Ken Martin
- Bill Mittelstadt
- Jay Murphy
- Arun Phadke
- Dick Schulz
- Ed Schweitzer
- Jim Thorp

Original Task Team Structure



DOE's NASPI Partners

- NERC
 - 2007 – 2013
- EPRI
 - 2013 – present
- Special thanks to Alison Silverstein for her service as the NASPI Project Manager
 - 2008 – 2019

NASPI Work Group Meetings

05/07	Carson, CA	06/12	Denver, CO	10/19	Richmond, VA
09/07	Montreal, QB	10/12	Atlanta, GA	04/20	Virtual
05/08	New Orleans, LA	02/13	Huntington Beach, CA	11/20	Virtual
06/08	Bellevue, WA	10/13	Rosemont, IL	04/21	Virtual
10/08	Charlotte, NC	03/14	Knoxville, TN	10/21	Virtual
02/09	Scottsdale, AZ	10/14	Houston, TX	04/22	Virtual
06/09	Sacramento, CA	03/15	San Mateo, CA	10/22	Charlotte, NC*
10/09	Chattanooga, TN	10/15	Chicago, IL	04/23	Tempe, AZ
02/10	Austin, TX	03/16	Atlanta, GA	09/23	Charlotte, NC*
06/10	Vancouver, BC	10/16	Seattle, WA	04/24	Salt Lake City, UT
10/10	Arlington, VA	03/17	Gaithersburg, MD	10/24	Charlotte, NC*
02/11	Dallas, TX	09/17	Springfield, MA	04/25	Minneapolis, MN
06/11	Toronto, ON	04/18	Albuquerque, NM		
10/11	San Francisco, CA	10/18	Philadelphia, PA		
02/12	Orlando, FL	04/19	San Diego, CA		

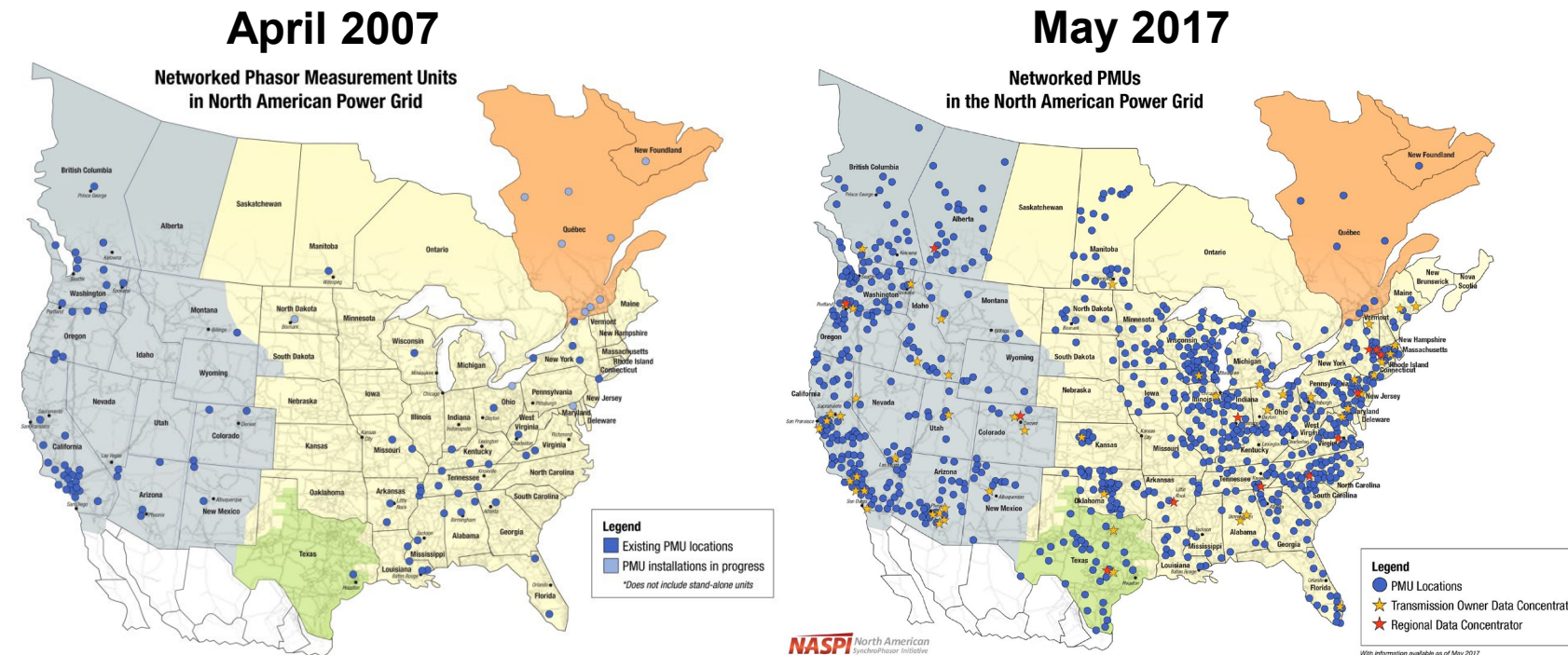
*Hybrid

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



“Better information supports better - and faster - decisions.”



MENU

NASPI

Scroll to
content



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www.naspi.org

Thank you

