NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Joint NERC SMWG/NASPI Task Force
Role-Based Synchrophasor Training

NASPI Meeting

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Vision Statement

To empower all critical utility stakeholders with tailored, role-based synchrophasor knowledge that drives effective integration, utilization, and business value realization of synchrophasor technology across the North American electric power industry.

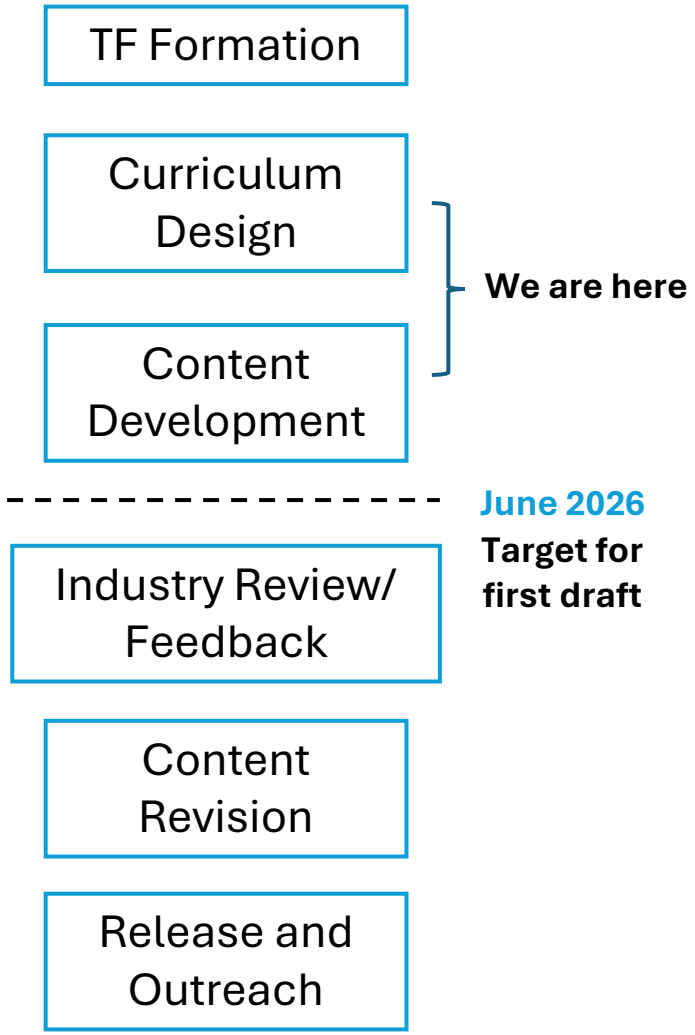
Targeted stakeholders:

I. Executive Leadership
II. Transmission Planning & Operations
III. Protection & Control
IV. Distribution Operations
V. IT & Cybersecurity
VI. R&D
VII. Compliance
VIII. Maintenance & Field Services

Role-Based Synchrophasor Training Task Force
Deliverable and Milestones

- **Deliverable**: Customizable, modular training package that enables utilities to train staff across multiple departments using their own system context.
  - Slide deck
  - Instructor notes
  - Suggested quizzes and discussion prompts
  - Placeholders for utility-specific content

Not a turnkey training solution.



Structure of Each Module

Each module articulates:

- Learning objectives
- Suggested time per topic
- Industry case studies
- Suggested quiz questions and discussion prompts
- Suggested placeholders for including organization-specific examples
- Suggestions for instructors

Role-Based Synchrophasor Training Task Force
Example: Protection & Control – Learning Objectives

Structured into three sub-modules:

- Tailored Advanced Fundamental Concepts [30 minutes]
- Fault Location, Isolation and Service Restoration [90 minutes]
- Enhanced Protection Schemes [90 minutes]

Enhanced Protection Schemes Module:

Learning Objective: Familiarize trainees with methods available for enhancing remedial action schemes (RAS) using Synchrophasor measurements.

At the end of this module, trainees will be able to:

- **Explain** the operating principles of synchrophasor-supported RAS
- **Identify** advantages associated with incorporating synchrophasors into common RAS schemes
- **Recognize** opportunities to employ synchrophasors to support microgrid operations and restoration processes, including black-start.

Role-Based Synchrophasor Training Task Force
Example: Executive Leadership – Learning Objectives

By the end of this training, executive leaders will be able to:

- Understand the strategic importance of WAMS in enhancing grid reliability, resilience, and flexibility.
- Recognize key business drivers for adopting synchrophasor technology, including compliance, risk reduction, and enabling integration of renewables and large data center loads.
- Identify the core applications and use cases of synchrophasor data as used by leading utilities and grid operators worldwide.
- Evaluate the business case for WAMS investments, including costs, benefits, and long-term value creation.
- Provide executive sponsorship and leadership to ensure successful adoption of synchrophasor technology within their organization.

Role-Based Synchrophasor Training Task Force
Example: Executive Leadership: Training Outline

- Module 1: Introduction to Synchrophasor Technology
- Module 2: Strategic Value and Use Cases
- Module 3: Synchrophasors in Practice – Case Studies and Use Case Examples of Applications
- Module 4: Business Case and Benefits
- Module 5: Implementation Requirements
- Module 6: Path Forward and Organizational Readiness

Role-Based Synchrophasor Training Task Force
Example: Transmission Operations – Knowledge Checks

Knowledge check

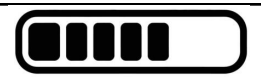
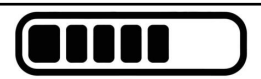
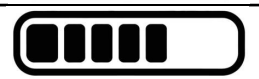
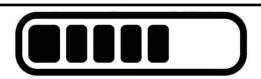
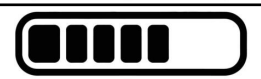
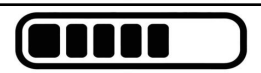
1. In one sentence, what does observability mean for linear state estimation, and what is an observable island?
2. Name the three main inputs to LSE and why each matters.
3. What are the key outputs operators/engineers should look at beyond estimated voltages?
4. Give two pre-LSE bad data checks and one cybersecurity-relevant timestamp issue.

Scenario (discussion / short write-up)
You are monitoring LSE and suddenly the system splits into multiple **observable islands** and alarms increase. Outline how you'd determine whether the cause is **PMU dropout/delay**, **bad timestamps/status words**, or a **model/mapping/topology** issue—then list the first two actions you would take.

Target Timeline

- Content gathered (by May/June 2026)
- Gather and incorporate feedback (June-Aug 2026)
- Editorial and graphic refinement (Aug-Sep 2026)
- Release and Outreach (Oct 2026…)

Role-Based Synchrophasor Training Task Force – Progress Update

Module	Module Lead	Curriculum Design	Content Development	Feedback Collection
Executive Leadership	**Neeraj Nayak (EPG)**		40% 	
Transmission Planning	**Shuchi Biswas (PNNL)**		95% 	
Transmission Operations	**Farrokh Aminifar (Quanta)**		95% 	
Protection & Control	**Mayank Nagendran (Zaphiro)**		95% 	
Distribution Operations	**Bryce Johanneck (Quanta)**		15% 	
IT & Cybersecurity	**Christoph Lackner (GPA)**		25% 	
R&D	**Hamed Mohsenian-Rad (UCR)**		90% 	
Compliance	**Nadia Smith (NERC)**		5% 	
Maintenance & Field Services	**Pavel Etingov (PNNL)**		20% 	
Customer Support	**Jim Kleitsch (ATC)**		70% 	

Questions and Answers