

ELECTRIC POWER
RESEARCH INSTITUTE

Demonstration of a Novel Synchrophasor-based Situational Awareness System

Wide Area Power System Visualization,
On-line Event Replay and Early Warning of
Grid Problems

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DOE SynchroPhasor Demonstration Project Objectives

- Develop and demonstrate a synchrophasor-based comprehensive situational awareness system
- Improve operator situational awareness to
 - Perform wide area power system visualization using real-time synchrophasor measurements
 - Provide early warning of potential system problems
 - Perform power system event replay for post event analysis

DOE SynchroPhasor Demonstration

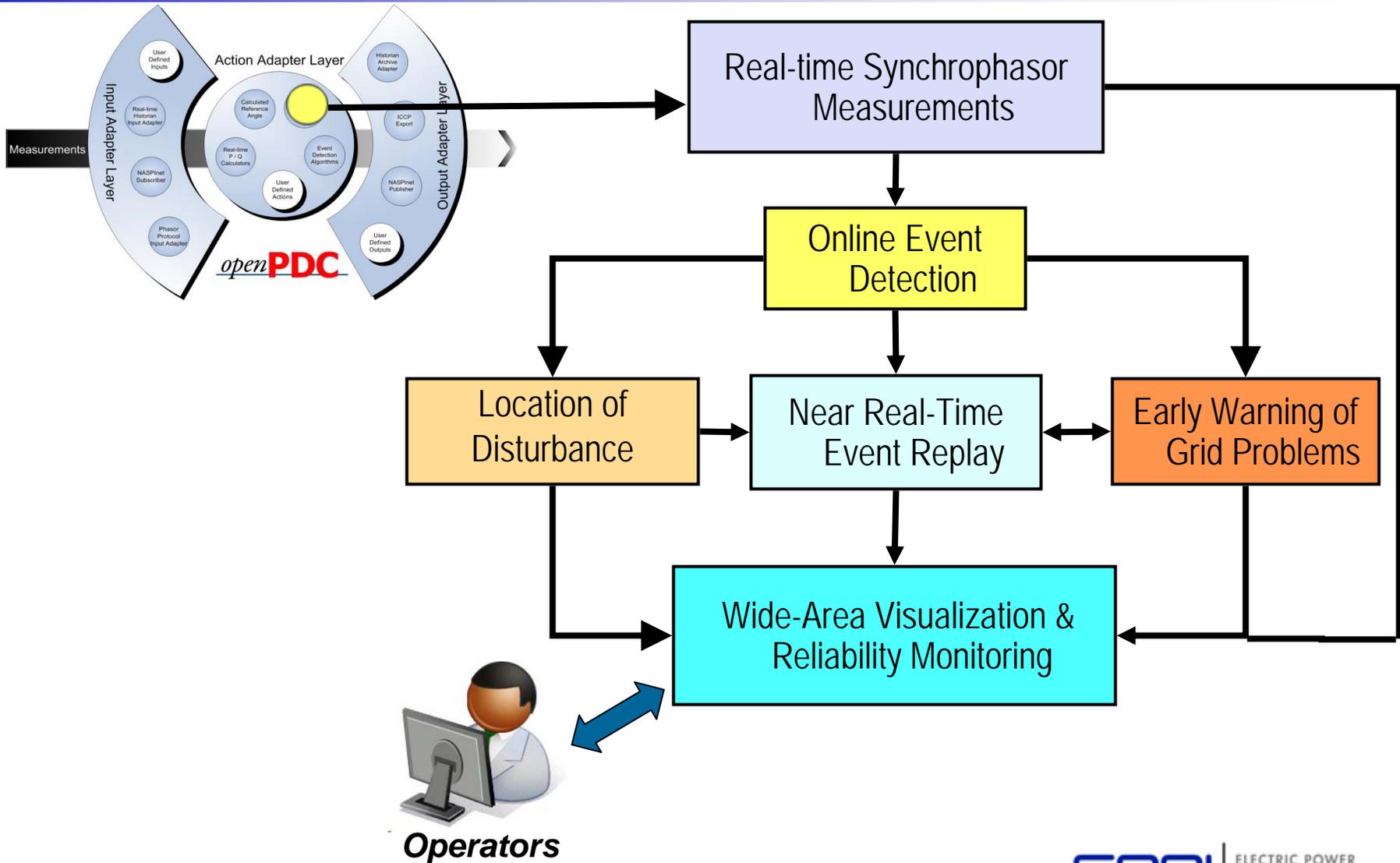
Roles of Project Teams

- **EPRI Team:**
 - Project Management
 - Research, development, integration and demonstration
- **TVA Team:**
 - Work with EPRI on technology development for efficient data processing and transfer
 - Integration with openPDC, demonstration and technical support
- **University of Tennessee at Knoxville (UTK) Team:**
 - Enhance location of disturbance application
 - Provide technical support for LOD integration and demonstration
- **HTC Tech:**
 - Research, development, integration, demonstration and technical support

Scope of Demonstration Using Real-time and Historical SynchroPhasor Measurements

- Real-time reliability monitoring using real-time synchrophasor measurements
- On-line event detection and location of disturbance
- Near real-time event replay
- Post event analysis
- Early warning of potential system problems (TVA area)

Main Application Modules



Project Phases and Technical Tasks

- **Phase 1 - Analytical Study**

- Task 1: Technology development for early warning of potential system problems
- Task 2: Technology development for efficient data processing

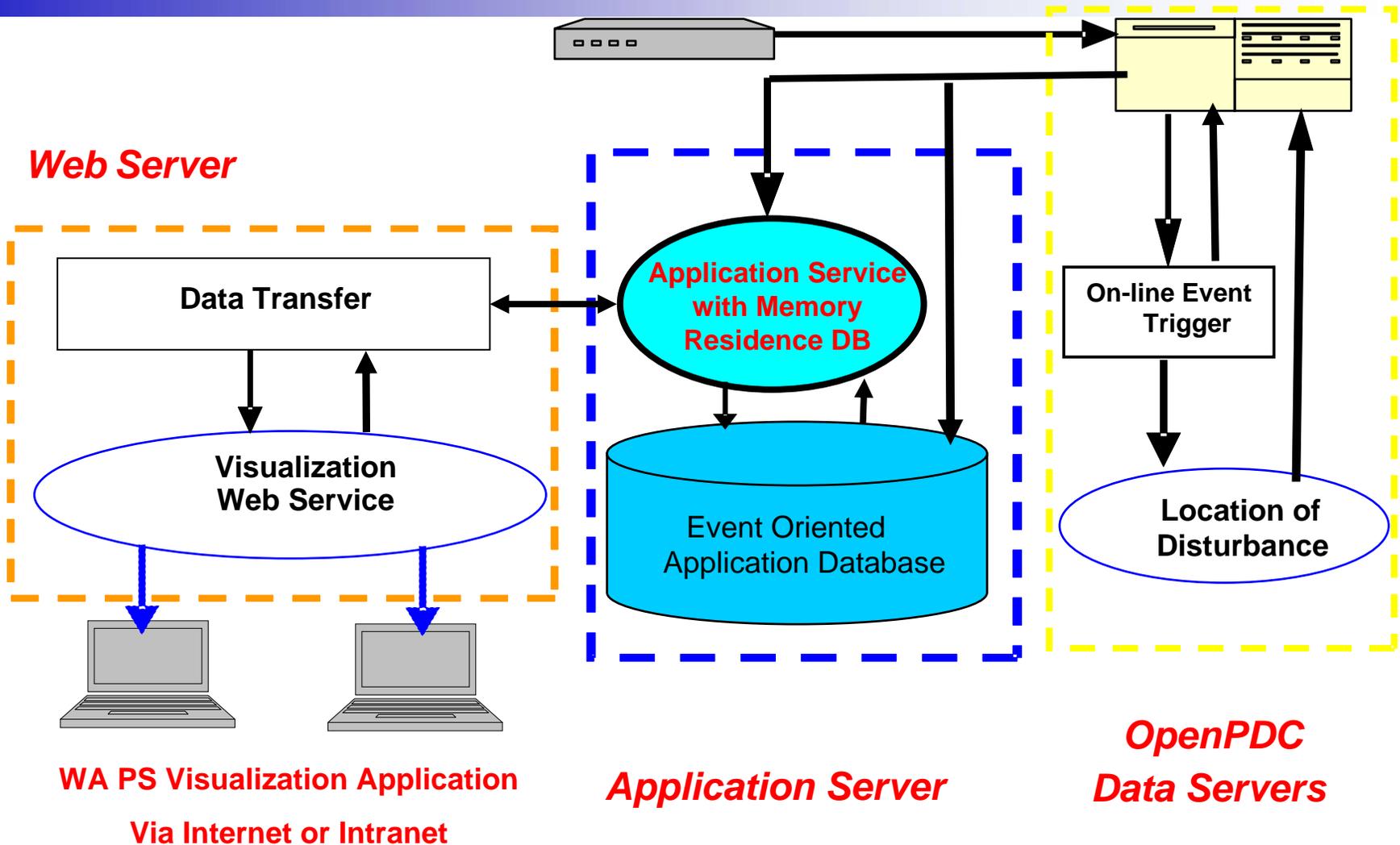
- **Phase 2 - Pilot Study**

- Task 3: Functional specification
- Task 4: Software development, integration and testing
- Task 5: System integration and testing

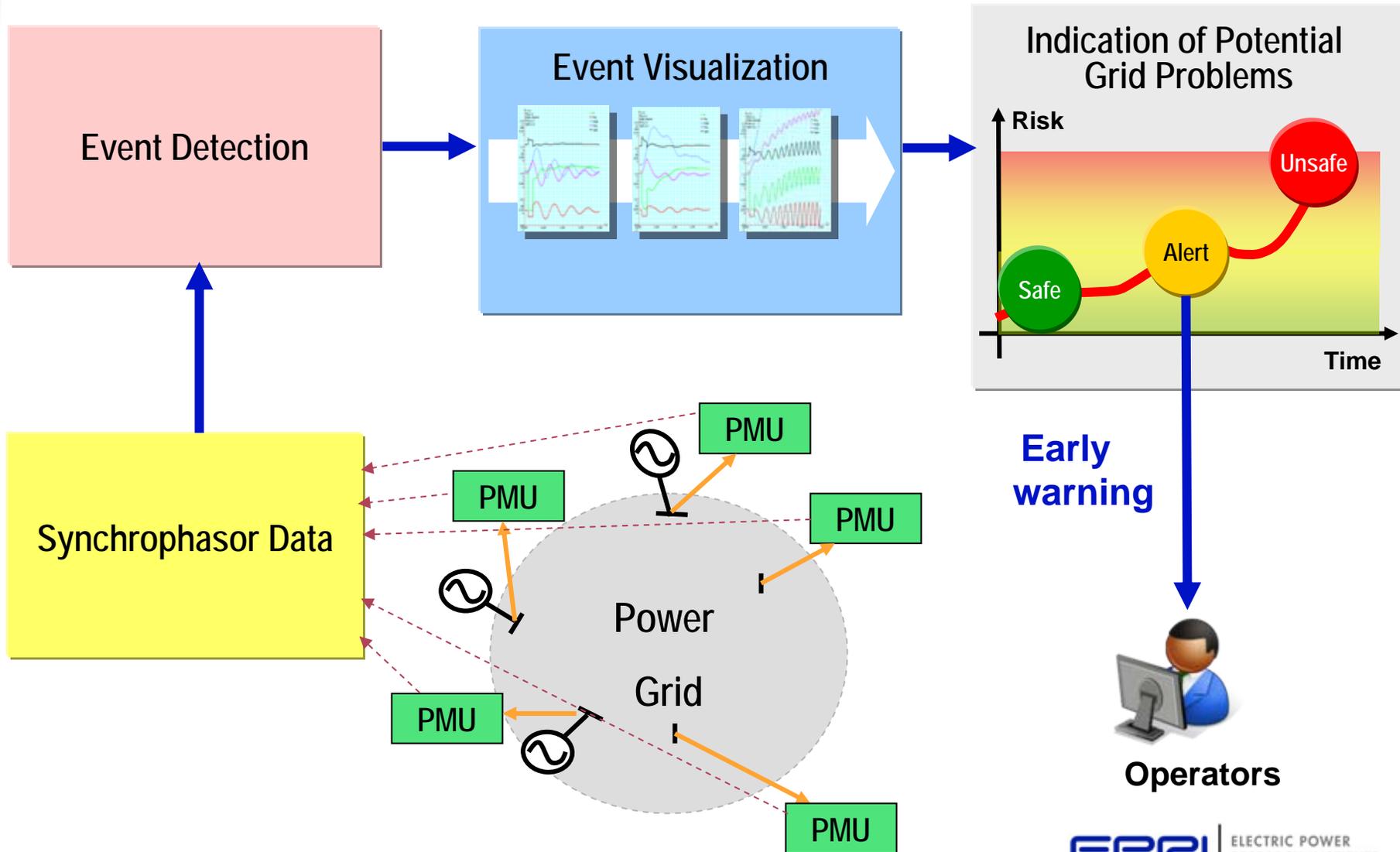
- **Phase 3 - Large Schedule Demonstration**

- Task 6: System installation and demonstration
- Task 7: Technical training and technical workshop
- Task 8: Technical support for 6 month

System Architecture Overview



Early Indication of Potential Grid Problems Using Real-Time Synchronphasor Measurements



Special Features of this DOE Demo Project

- Integrate with distributed openPDC
- Provide high performance wide area power system visualization
- Replay new sequence of events in near real-time with full resolution
- Integrate location of disturbance application
- Perform post event analysis
- Provide early warning of potential system problems