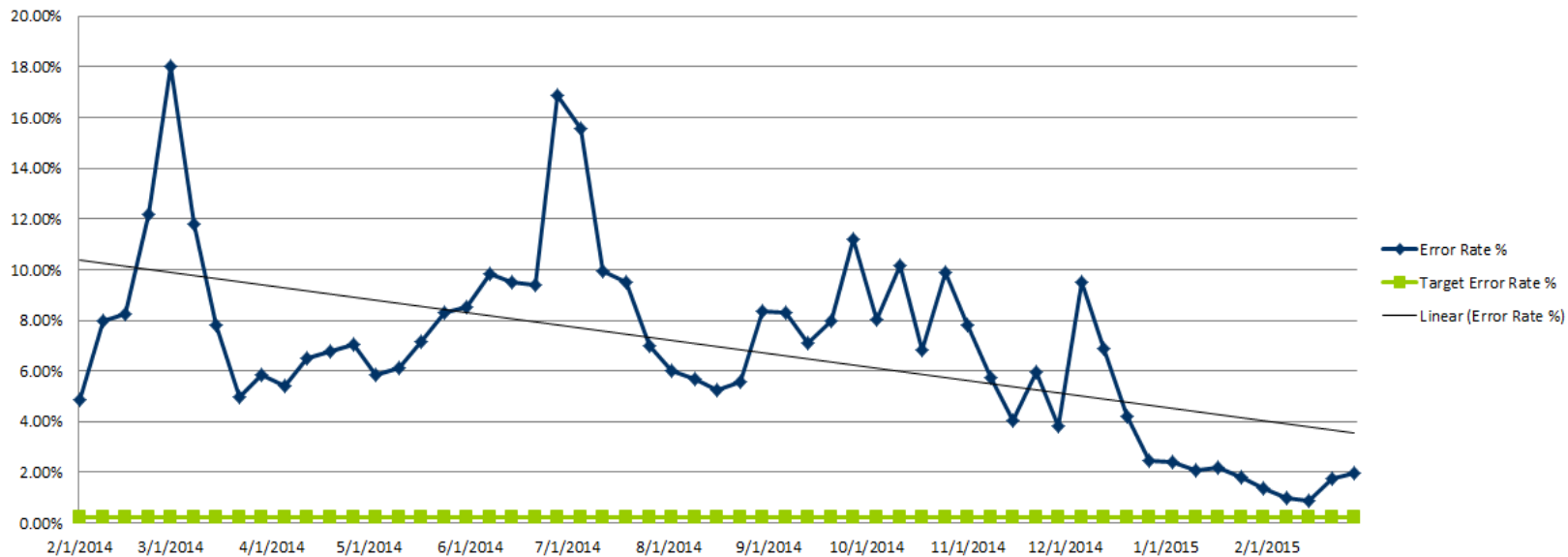


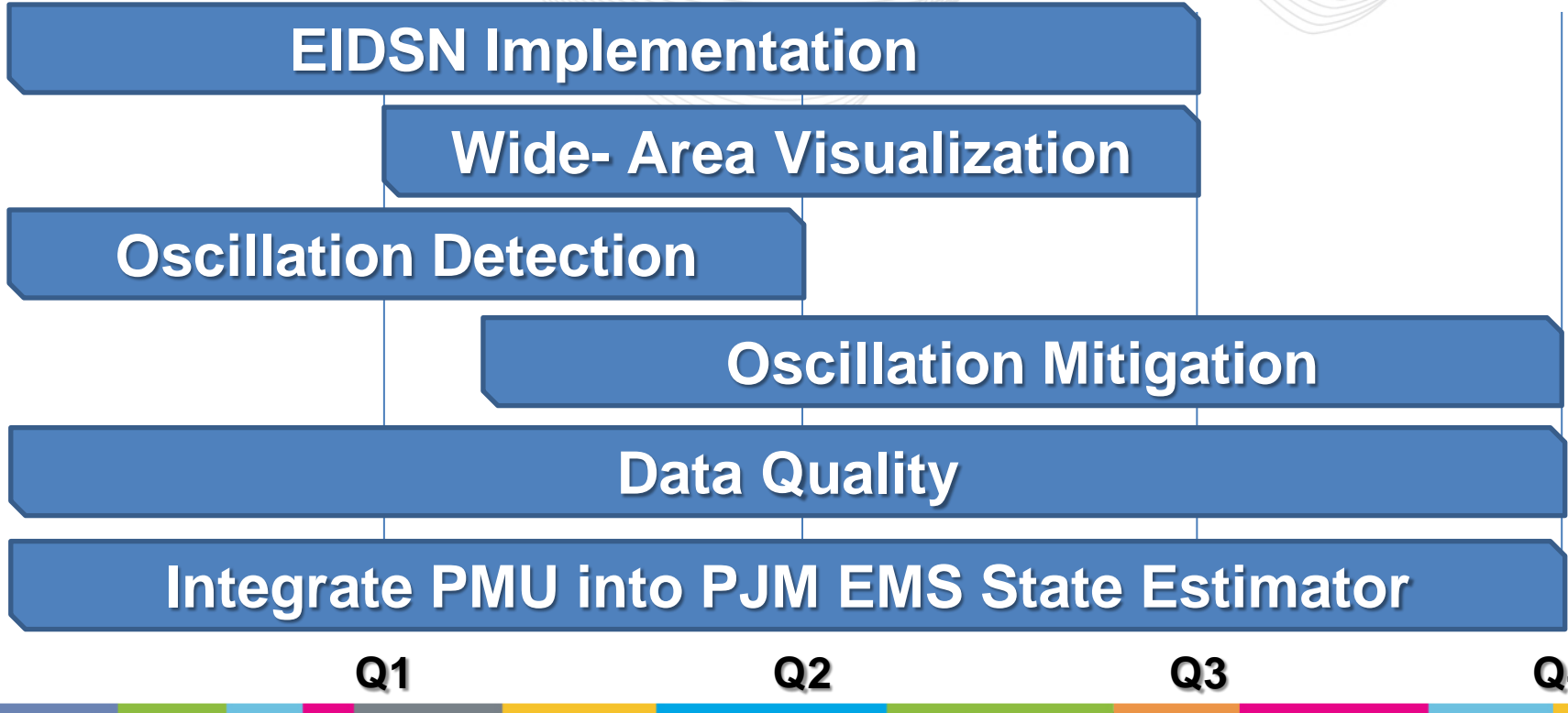


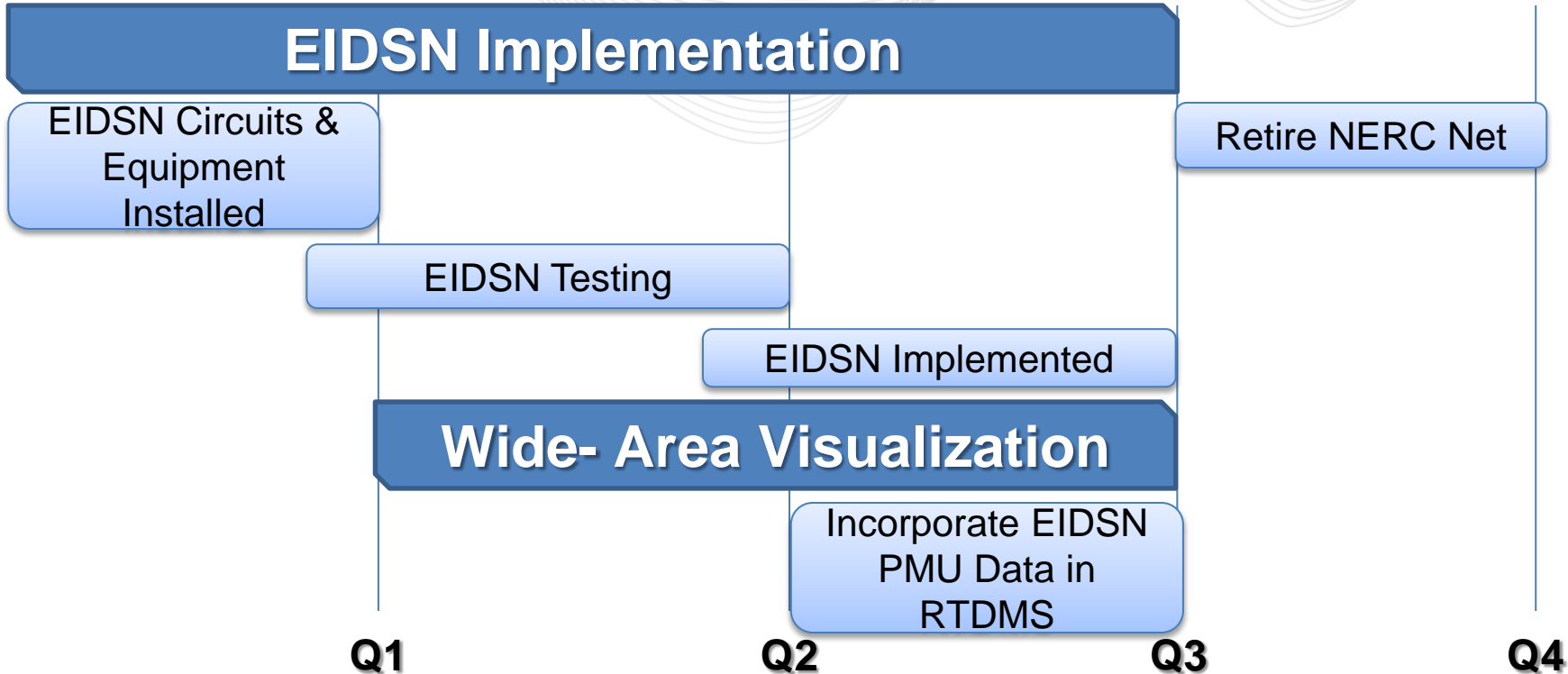
# Synchrophasor Update

March 3, 2015  
TOA-AC

### PMU Error Rate Trend, All TOs







## Oscillation Detection

Implement & Test Algorithms within RTDMS Test Environment

Implement within RTDMS Production

## Oscillation Mitigation

Develop Procedures & Training

Conduct Operations Training Sessions

Procedures in Effect

Q1

Q2

Q3

Q4

## Data Quality

Expand Data Quality tool & methods to condition real-time phasor output.

Linear State Estimation Implementation & Results Evaluation

Seek TO Approval (via PDQTF) for use of LSE in Reporting

Incorporate LSE Results into PMU Data Quality

Q1

Q2

Q3

Q4

- NERC BES Reliability Operating Services (BROS)
  - ✓ evaluation criteria documented in CIP002-5.1 (page 17-33):  
[http://www.nerc.com/pa/Stand/Reliability%20Standards/CIP-002-5\\_1.pdf](http://www.nerc.com/pa/Stand/Reliability%20Standards/CIP-002-5_1.pdf)
- PJM Operations/Compliance staff applied the NERC BROS criteria in determination of CIP Criticality.
  - ✓ Criteria: Would there be an adverse impact if a Cyber Asset that if rendered unavailable, degraded, or misused would, within 15 minutes of its required operation, misoperation, or nonoperation, adversely impact one or more Facilities, systems, or equipment, which, if destroyed, degraded, or otherwise rendered unavailable when needed, would affect the reliable operation of the Bulk Electric System.

## ➤ BES Reliability Operating Services:

- ✓ Dynamic Response,
- ✓ Balancing Load and Generation,
- ✓ Controlling Frequency (Real Power),
- ✓ Controlling Voltage (Reactive Power),
- ✓ Managing Constraints.
- ✓ Monitoring and Control,
- ✓ Restoration of BES,
- ✓ Situational Awareness,
- ✓ Inter-Entity Real-Time Coordination and Communication.



- PMU technology is not currently CIP Critical
  - ✓ Earliest possibly CIP Critical is approximately 1 year.
- PMU Potentially CIP Critical when PMU data is :
  - ✓ Integrated into PJM EMS State Estimator & used in the solution (~1 - 2 years).
  - ✓ Becomes critical to Interconnection Reliability Operating Limit (IROL) Determination (~ 1 – 2 years).
  - ✓ Is explicitly identified within NERC Functional Model (~2 years).
  - ✓ Is utilized as part of automated control of field equipment (~ 3 – 5 years?).
  - ✓ Is utilized by PJM System Operator without the need to verify measurement with asset owner (?).

Questions?