



PJM Interconnection Smart Grid Investment Grant Update

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- **PJM Leads:**

- Project Manager: Bill Walker (walkew@pjm.com)
- SynchroPhasor Technical Lead: Mahendra Patel (patelm3@pjm.com)

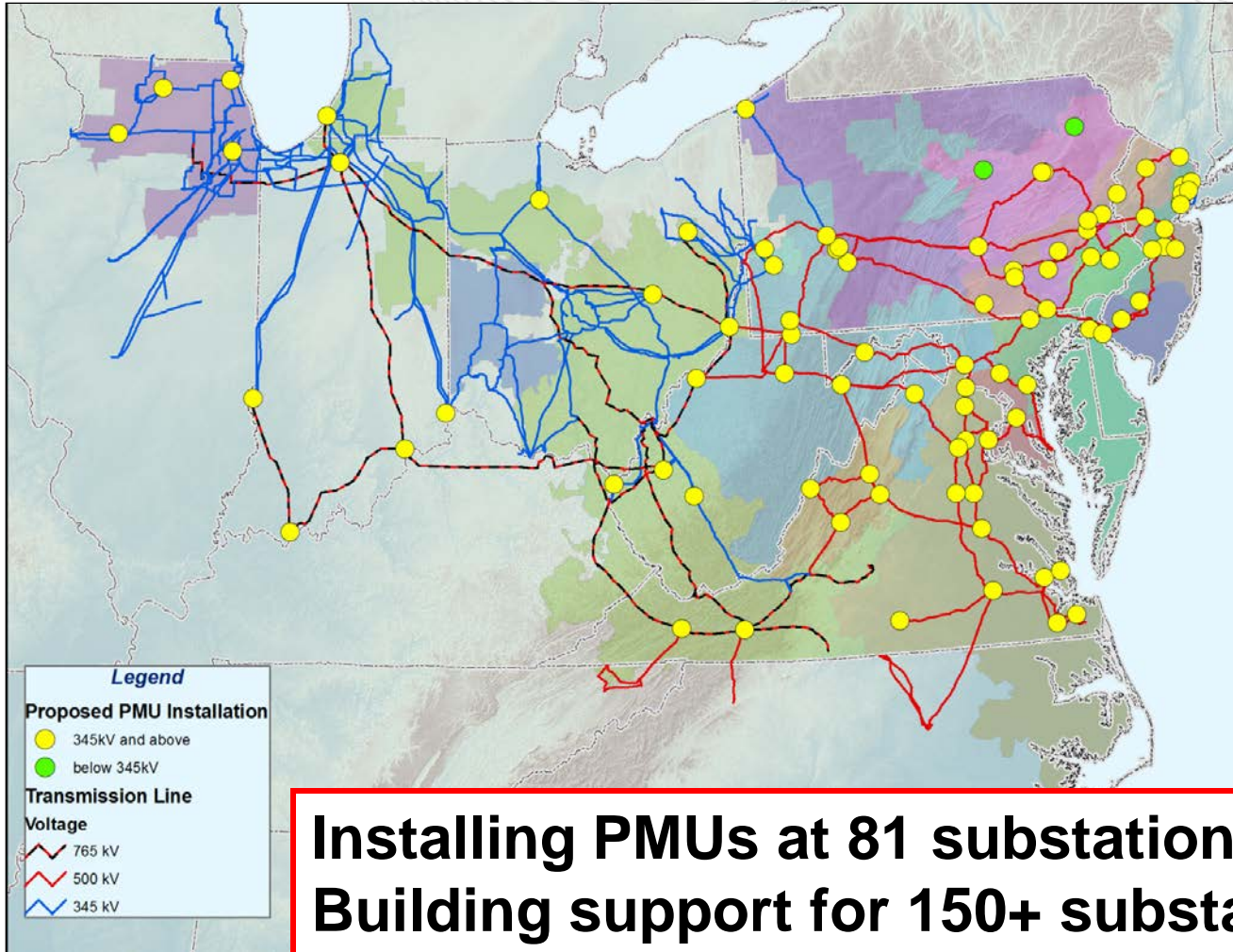
- **Vendor Partners:**

- Electric Power Group (PDC and visualization software)
- Quanta Technology (engineering/project management)
- Virginia Tech University (PMU/PDC device testing)

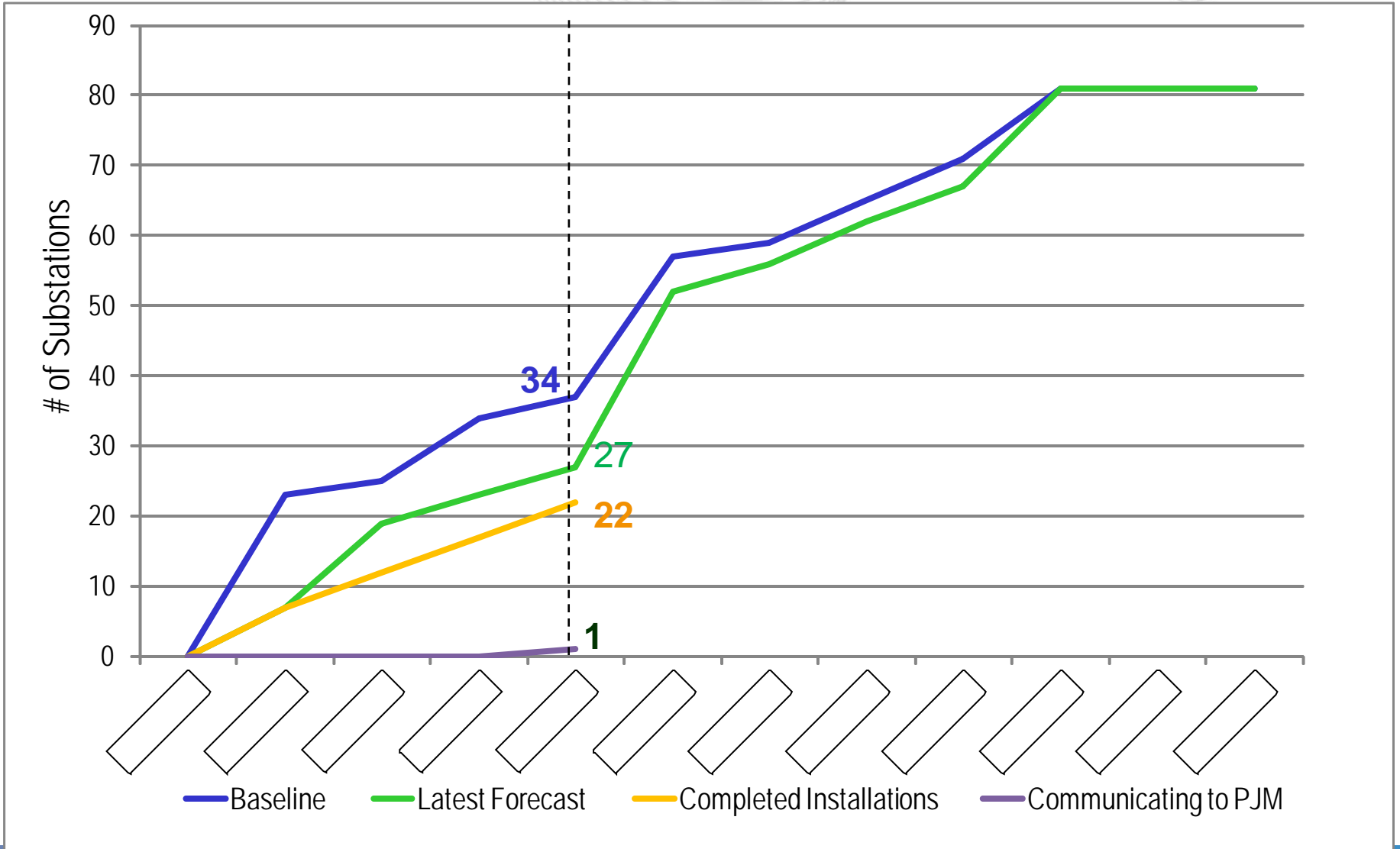


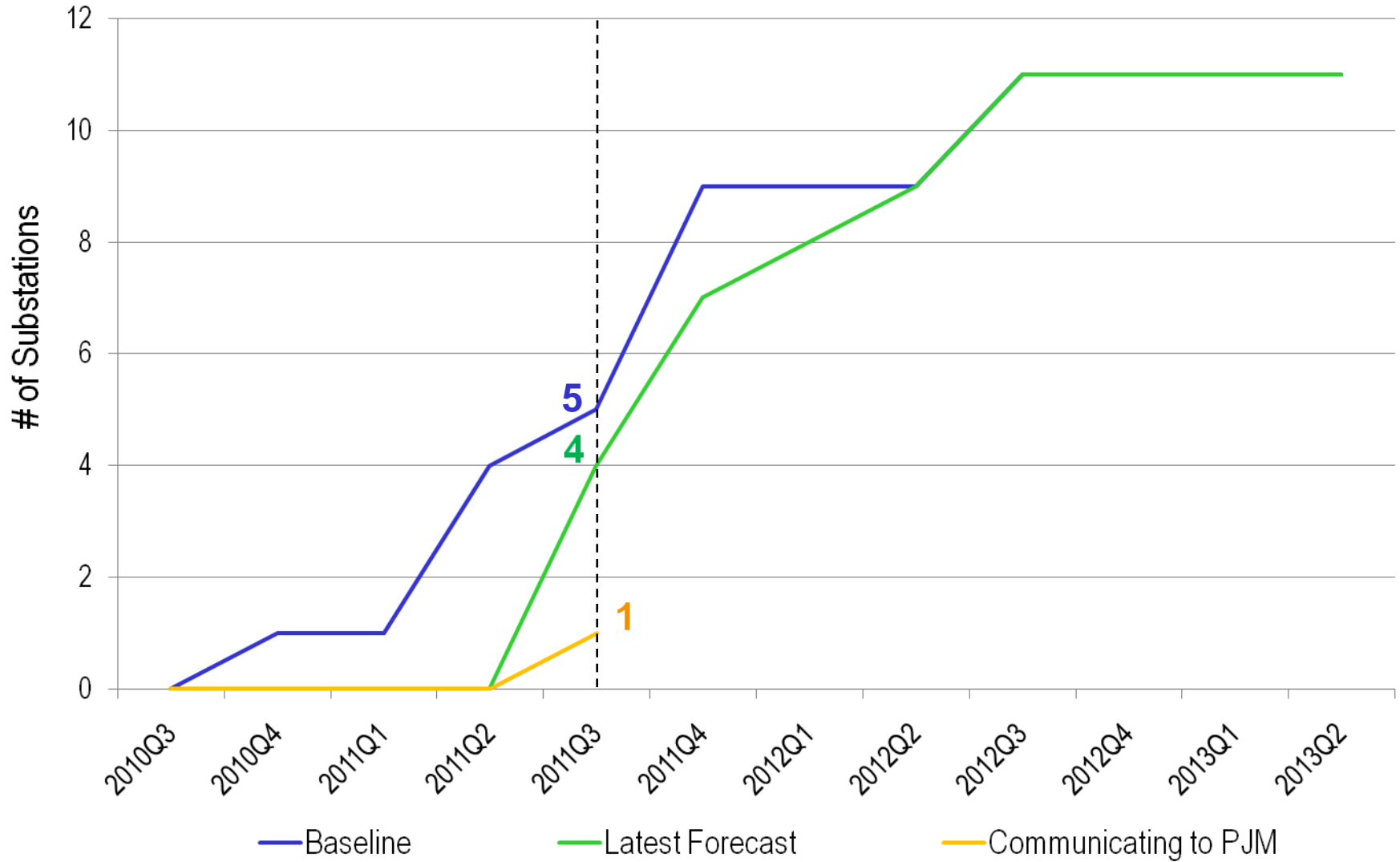
PJM's Participating Transmission Owners

Transmission Owner	# of Substations with PMU Installations	# of Central PDCs
Allegheny Power	8	0
American Electric Power	15	1
Baltimore Gas & Electric	2	2
Commonwealth Edison	4	1
Duquesne Light	2	2
FirstEnergy Services	7	2
PECO Energy	3	1
PEPCO Holdings Inc.	4	2
PPL Electric Utilities	12	2
Public Service Electric & Gas	12	2
Rockland Electric	1	1
VA Electric & Power (Dominion)	11	2



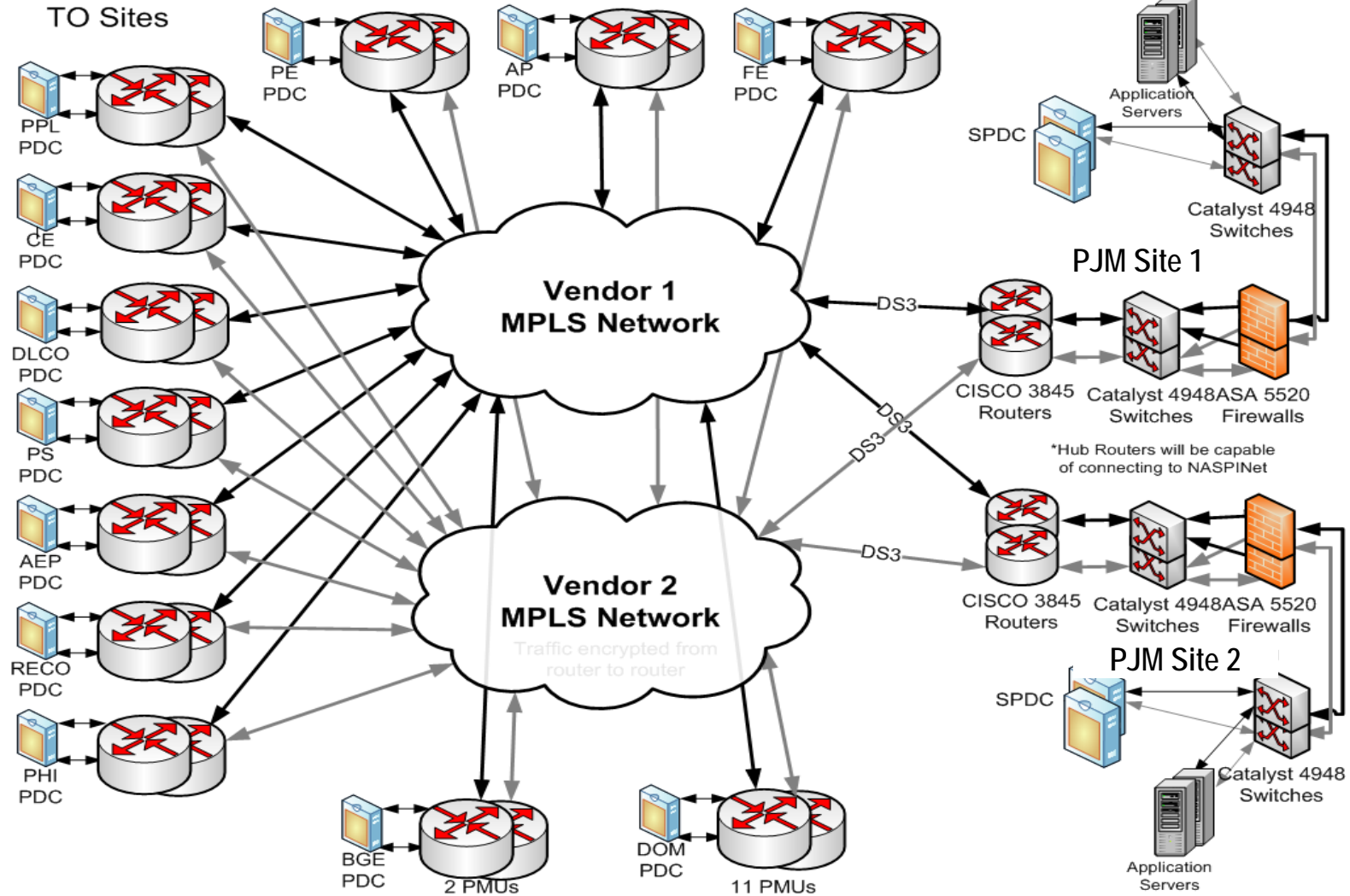
- Activated first PDC in August 2011
 - Receiving measurements from three (3) phasor units
- Installed T1 telecommunication lines at four (4) Transmission Owner sites; three (3) in progress
- Targeting six (6) additional TO connections by end of 4th quarter 2011
- PJM receiving phasor data from MISO





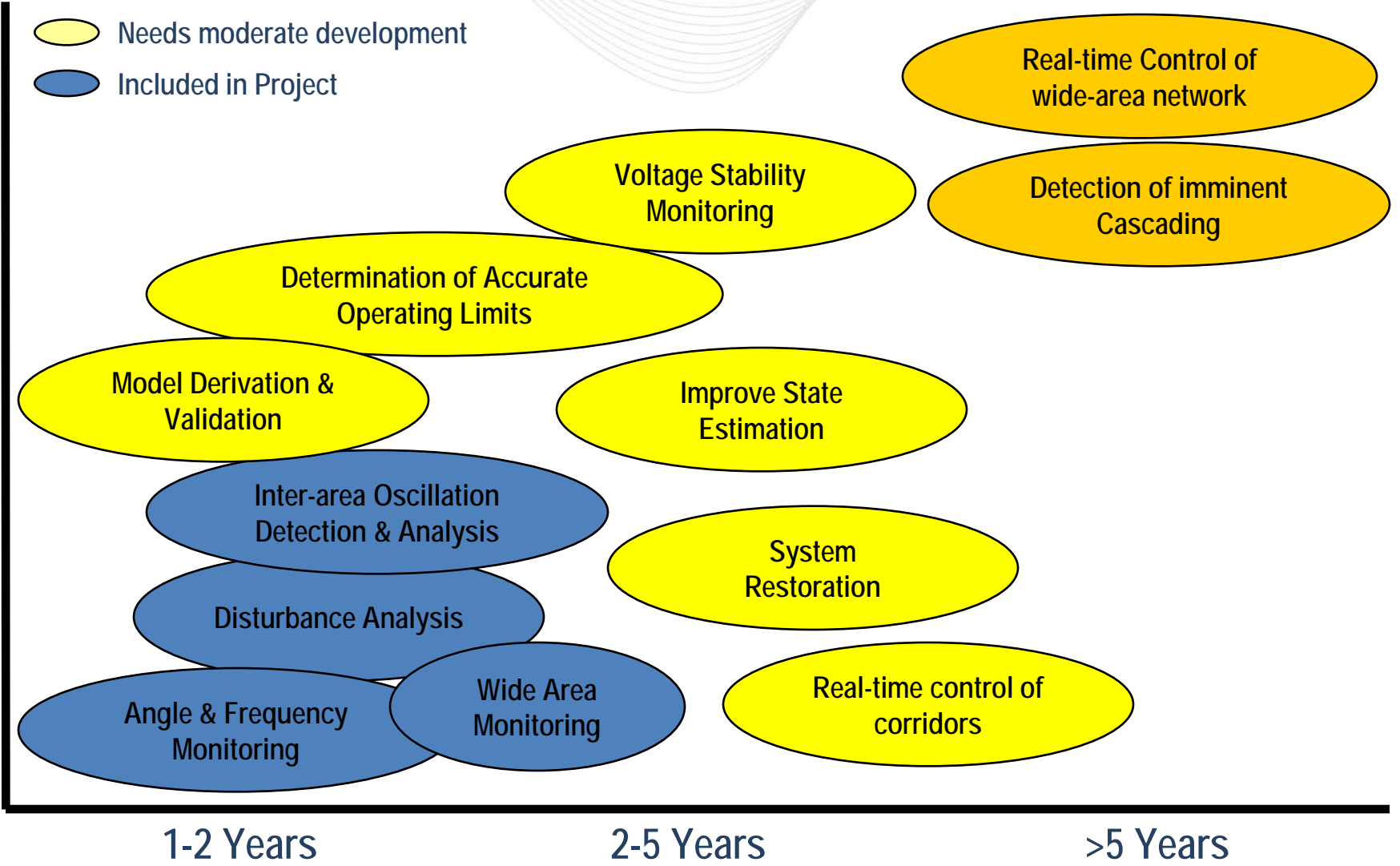
- 12 Transmission Owners installing measurement devices at 81 substations
 - TO's selecting their own vendors
- Transmission Elements Monitored
 - 64 > 345kv; 17 < 345kv
- Approx. 20% of regional footprint monitored
- Installing PMU's, Relays, DFRs, DDRs
- Installation rate
 - 24 as of 09/2011; 47 by EOY 2011
 - 81 by EOY 2012

- PDCs
 - 11 TO Control Centers with Central PDC
 - Archive Database Status
 - Storage Size - TBD
 - Data retention
 - 90 days real-time; 1 year near-real-time; 7 year archive
- Communication System
 - 11 dedicated links to TOs (T1 lines)
 - 2 dedicated MPLS Clouds; 1 Verizon and 1 AT&T



- Requires more research
- Needs moderate development
- Included in Project

Deployment Challenge



- **High-level Project Challenges**
 - Evolving standards, technologies, & security guidelines
 - Coordination of all project stakeholders
 - TOs, Vendors, ISO/RTOs, DOE
 - TO Installation Schedule Changes
 - Estimated cost vs. actual cost spending gaps
 - Expanding scope to use available funds
 - Installing additional PMU's
 - Data Exchange with neighboring RTO/ISO's
 - Developing additional software applications
 - R&D approach vs. “touch it once” approach

- **Architecture, Design, & Communication**
 - Confidence in performance of PMU/PDC equipment
 - Ensuring the architecture is scalable
 - Add more PMU's in the future
 - Database sizing and format
 - Complexities of sharing data between RTO/ISO, etc.
 - Internal IT architecture design
 - High-availability
 - Software limitations
 - Latency and throughput
 - UDP vs. TCP Communications

- DOE Site Visit June 2011
- Recommendations
 - Update Project Execution Plan w/ schedule adjustments
 - Update Cyber Security Plan to show coordination with TO plans
 - Provide more detail on monthly reporting
 - Match invoice categories to original budget
- All related action items completed

- Other Project Updates
 - PJM and MISO currently sharing data
 - Continue to expand data sharing
 - Working with other RTO/ISO's to create data sharing requirements
 - Talking to additional vendors on using SynchroPhasor data in existing applications

Thank You