

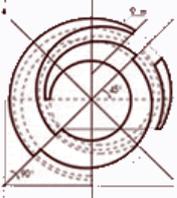
ALSTOM

**DoE Advanced C&C Program  
Peer Review Meeting**

Oct. 28-30, 2003

Ali Ipakchi

**ALSTOM**



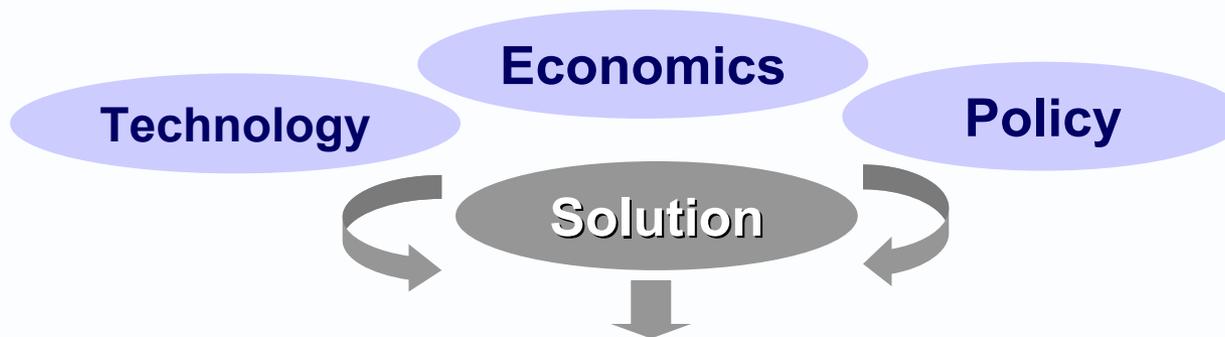
# Project Objective



Develop and Demonstrate Advanced Communications and Control Systems that Enable Retail Energy Companies to Capture Value at End-Use and Power System Level, Minimize Operating Risks, and Maximize Benefits through Coordinated Operation of Distributed Energy Resources.



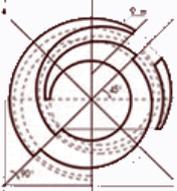
- Large Scale & System Level Integration
  - Multi-Region (Regulatory, Utility, RTO), Emphasis on Large C&I Customers, Diverse Resources
- Emphasis on Market Integration of DER
  - Markets are where values to be captured originate
- Address Both Business and Technical Issues
  - Economic problem driving technical problem
  - Industry practices and policy also influencing economics



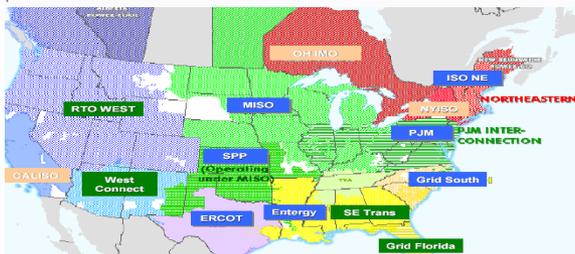
**National Large Scale Integration of DER With Power Systems and Energy Market Operations**

- National Energy Service Provider
  - Several Thousand MW of Load being Managed
- Operations Center
  - Resource Management and Operation
  - Trading, Scheduling and Risk Management
  - Energy Services
- Substantial Customer Base with DER Capabilities
  - Industrial and Commercial processes, existing resources
  - Connectivity and market coordination to tap DER potential





# ALSTOM's Market to Meter Solutions



**Energy Market Management**



**Wholesale Trading**



**Retail Trading**



**Generation Operations Mgmt**

**Transmission Operations Mgmt**

**Distribution Mgmt**

**End Use Energy Optimization**

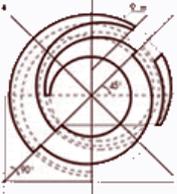


**Data Acquisition and Communications**



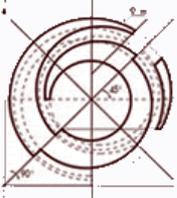
**Substation Automation, Measurement and Control**





# Phase I: Two Complementary Tracks

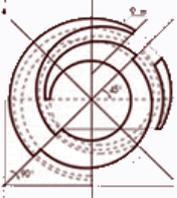
- **Track 1: Market Integration Roadmap / Architectural Blueprint**
  - **Multi Market, Multi Regional Operations**
    - DER as Integral Part of Power System Operations
    - From Resource to Market
  - Business Transactions and Physical Power Delivery
  - Industry Practices, Existing Standards, On-Going Initiatives
  
- **Track 2: Proof of Concept**
  - Operational & Trading Perspective of **National Energy Retailer**
  - “Real-time Energy Management” of 3 Large Cement Plants in 3 **different RTO Regions**
  - Real-time visibility to markets and usage data augmented by automated alarming and notification



# Work in Progress

- Project fully contracted in September 2003
- Progress to date:
  - Architectural Blueprint (Work In Progress)
  - Requirements Specification
  - Proof of Concept Site Interface Specification
  - Implementation Plans
  - POC Development Activities

ID	Task Name	2004					
		September	October	November	December	January	February
1	Received Full DOE Contract	█					
2	<b>Subcontracts in Place</b>	█	█				
6	<b>Track I System Architecture</b>	█	█	█	█		
12	<b>Track II Proof of Concept</b>	█	█	█	█	█	
13	<b>Site Data Interfaces</b>	█	█	█	█		
18	<b>ISO Interfaces</b>	█	█	█	█		
26	<b>Alarming System</b>		█	█	█		
30	<b>Decision Support, Alarming Logic</b>		█	█	█		
34	<b>Delivery and Testing</b>				█	█	
38	<b>Final Report</b>				█	█	█



# Track 1: Market Integration of DER



**Industrial**



**IPP**



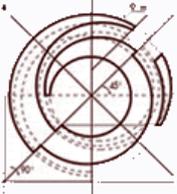
**Commercial**



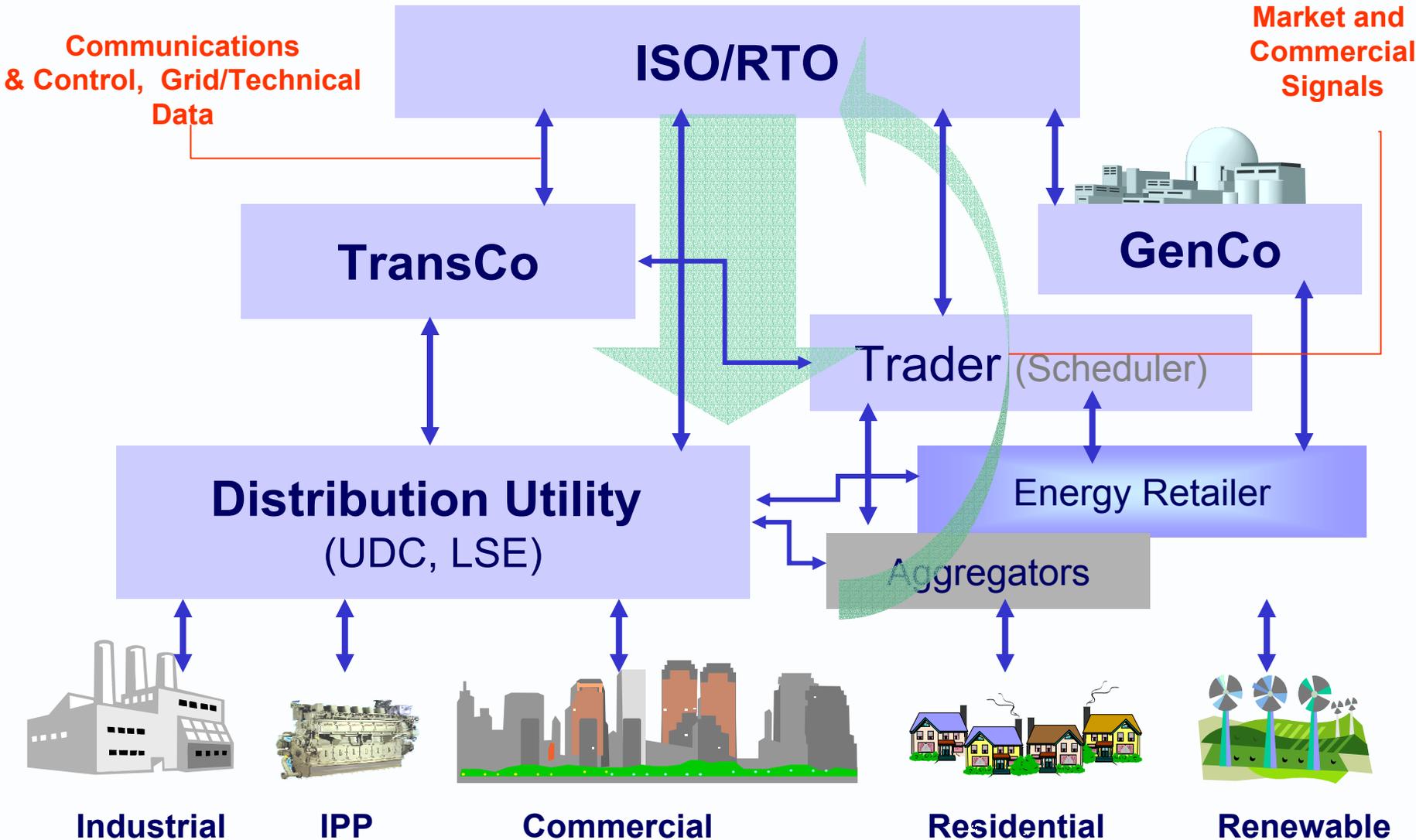
**Residential**

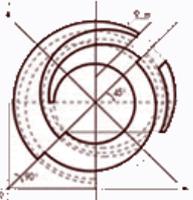


**Renewable**



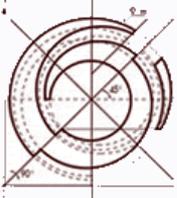
# Track 1: Information Exchange Needs



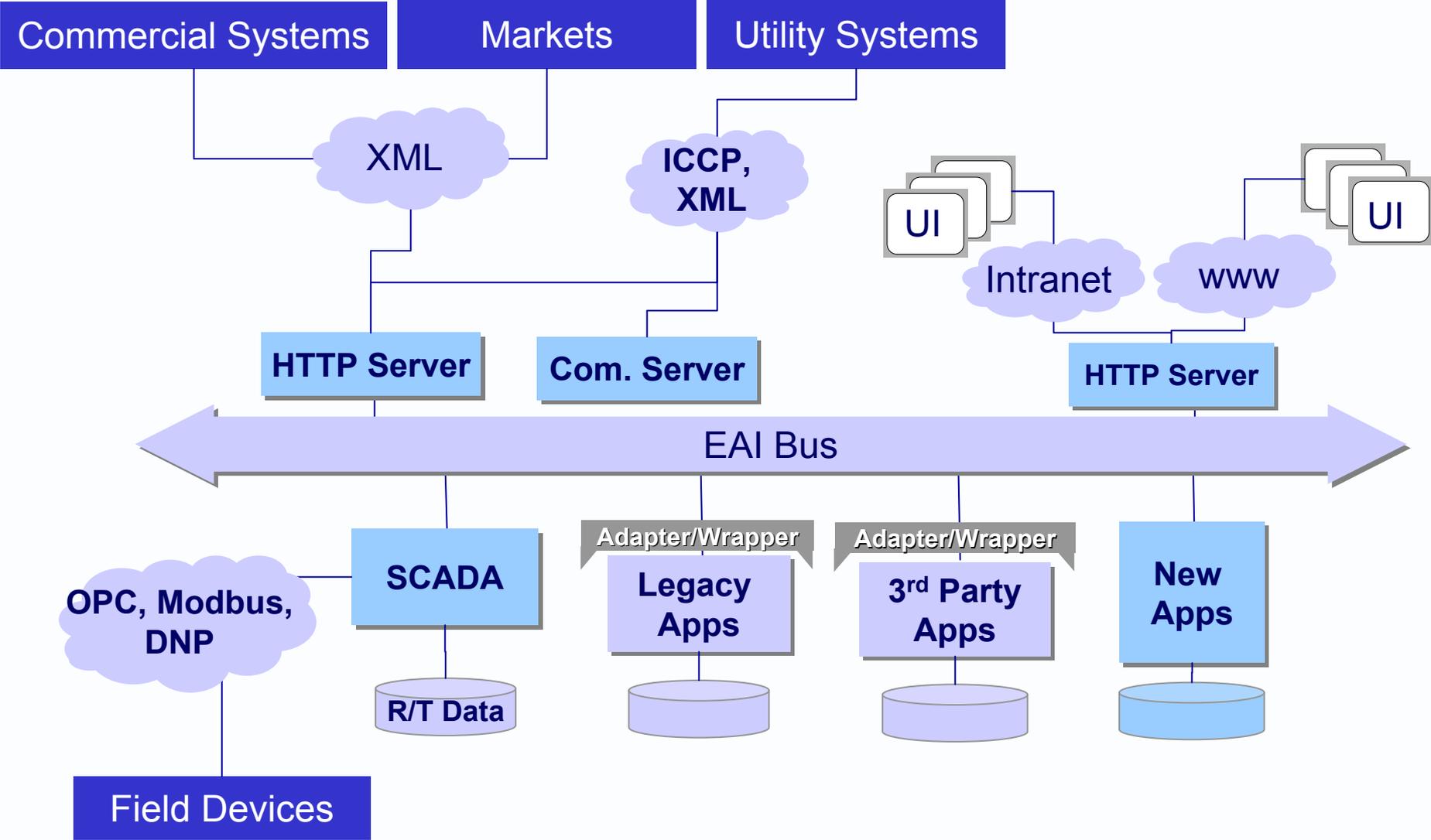


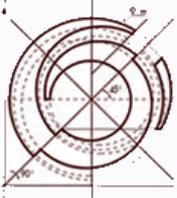
# Track 1: Planned Deliverables

- Stakeholder Interfaces: Commercial and Technical
  - Business Flow, Functions, Information
    - Energy Retailer Intra-Business
    - Inter Stakeholder Interfaces
- Industry Practices, Existing and Emerging Standards
  - Industry Initiatives and Constraints
- RTO Plans for Demand-side Participation
  - PJM, MISO, NY ISO, ERCOT, CA ISO
  - Meetings and Discussions
- A High-Level Recommended Blueprint for Broad-Based Market Integration of DER

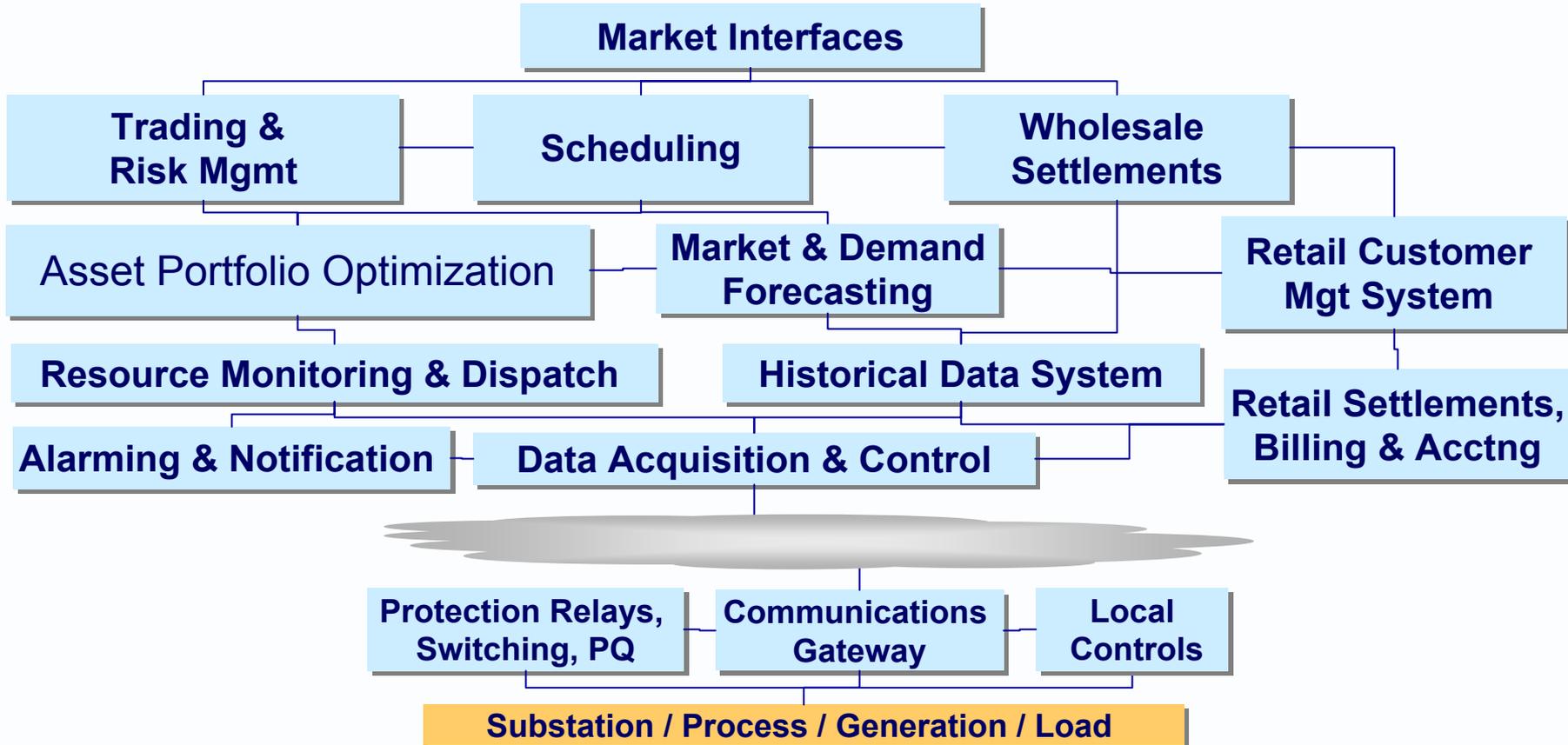


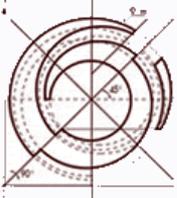
# Energy Retailer System: Architectural Overview



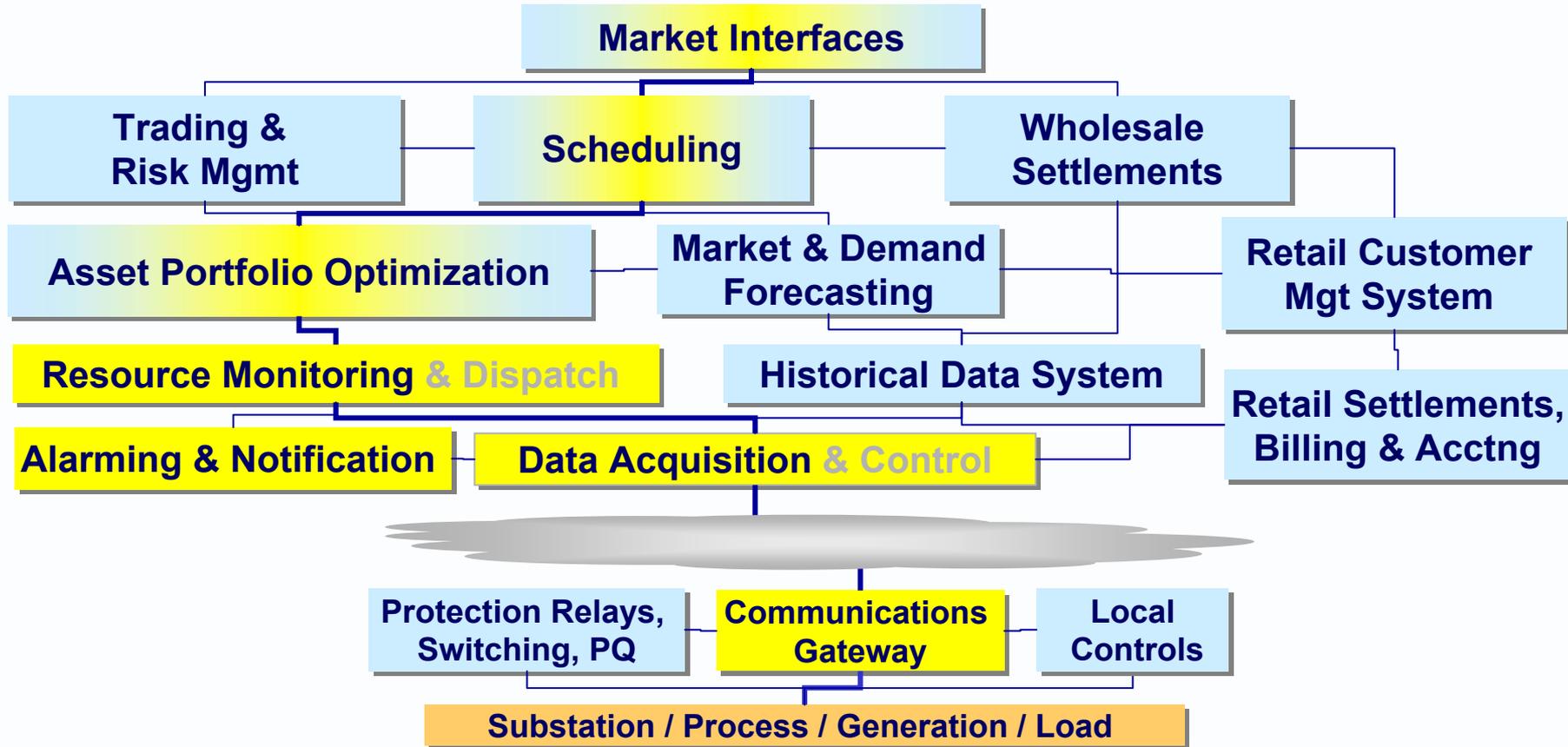


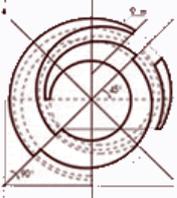
# Energy Retailer System: Functions



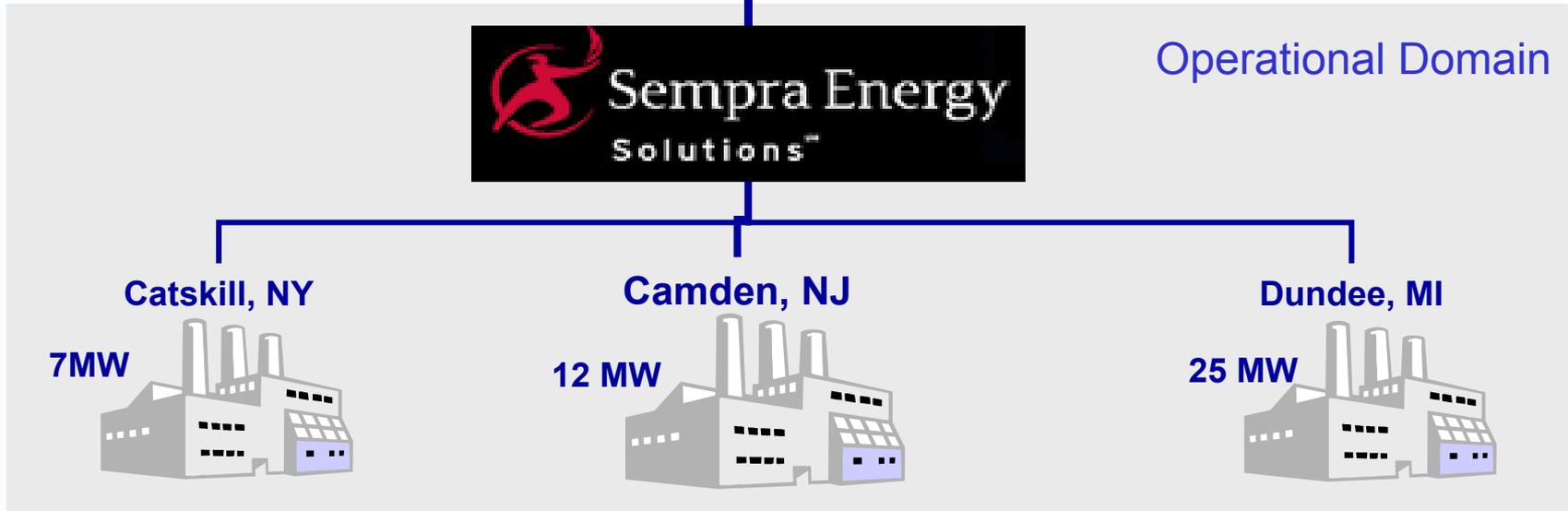


# Track 2: Proof of Concept Scope

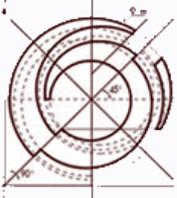




# Proof of Concept Demonstration



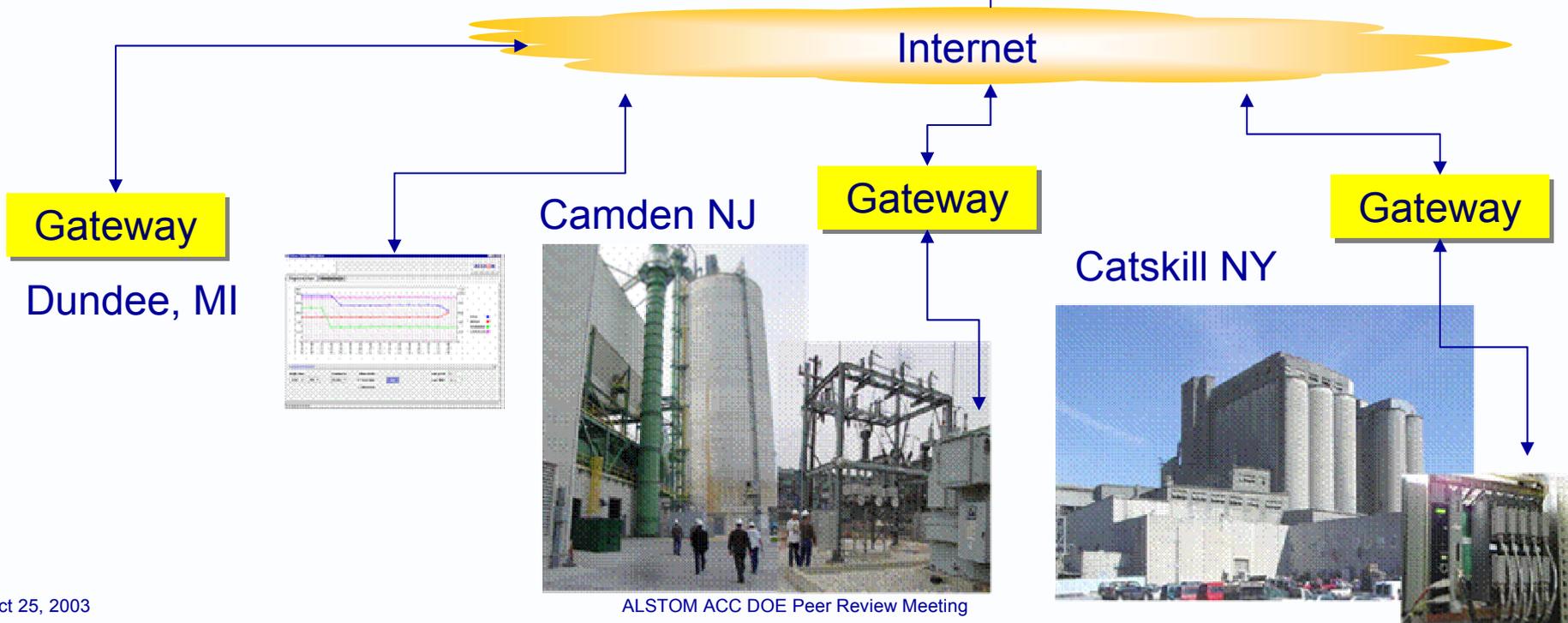
- Primary/Secondary Crusher (2 units) – 1 Mw
- Raw Mill Grinding – 2.5 Mw
- Kiln (Furnace) – 2.5 Mw (prefer not to shutdown)
- Finish Grinding (2 Units) – 4Mw
- Shipping/Loading – 800 Kw

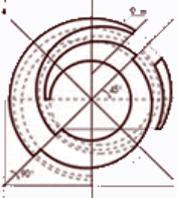


# Plant Data Communications

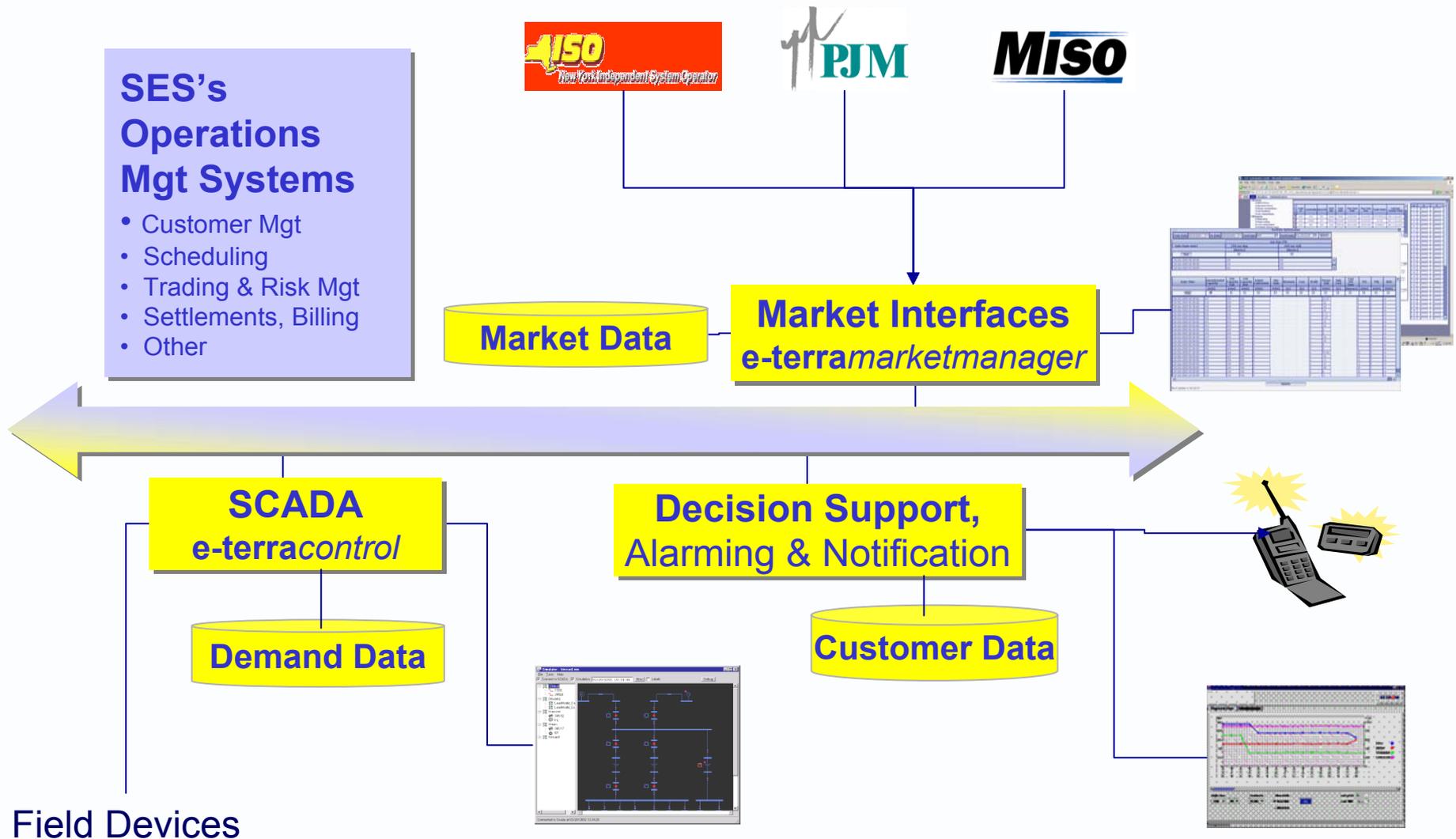


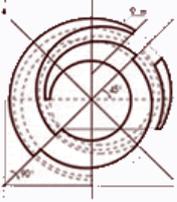
- Real-Time Link over IP
- Economical & Proven Solutions
- Industry Standards
- Full Function and Highly Scalable



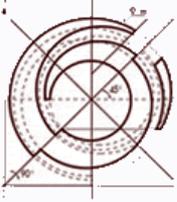


# Market Interface and Decision Support Functions

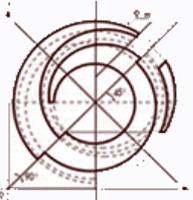




- **Validate Business Process Functions for Value Capture and Risk Management**
  - Integration with Existing Front and Back Office Functions
  - Economic Assessment of Alternative Operating Scenarios
    - Market Opportunities/Commodities, Simulations, Shadow Settlements
  - Decision Support Tools for Economic Operations
    - Market Interfaces
    - Process Capability Monitoring, and Assets Portfolio Optimization
    - Market and Customer Settlements (data management needs)
- **Utility and Systems Operator Interface Requirements**
  - System Scheduling and Reliability
    - On-Site Generation Switching, Load Shedding
  - Ancillary Service Markets and Operations
- **Infrastructure Economics and Paybacks**



- Significant Cost Sharing by the Project Team
- Project Team's Commitment to this line of business
- Quick and Immediate Adoption
  - Existing Operations and Business Practices
  - Existing Tools and Capabilities
- Intention to Develop Solution for Mass Markets
- Affordability through Multi-dimensional Value Capture
  - Multi-market opportunities and tapping portfolio of customer resources
- Robust class of industry-proven tools
  - For C&C of resources in mission critical grid operations
- Resilient business model
  - Energy Retailer managing portfolio of DER so RTOs can rely on resources for enhanced grid reliability



# Proposed for Phase 2

- Full Demonstration of End-to-End Functions at a National Level
- Expanded Coverage of Diverse Resources in Multiple Markets
- Advanced Tools for Portfolio Optimization and What-If Analysis
  - Planning and Pricing Tools
  - Operational Strategy, and Energy Process Optimization Tools
- Coordination with RTOs for Demand Response Market Design
  - Information Needed by RTOs to rely on DER (Object Models and Operational Transparency)
  - Standardized market structures associated with DER
- Coordination with Utilities and System Operators
  - On-Site Generation and Load Curtailment
- Collaboration with Standards Organizations for Adoption
  - Cross-body discussion for adoption of extended models (IEEE1547.3, E2I)
  - DER interoperability/utilization across regional markets

The ALSTOM logo is centered on a white semi-circular background. The letters 'ALST' and 'M' are in a bold, dark blue sans-serif font. The letter 'O' is replaced by a red circular graphic consisting of two concentric rings, with the inner ring being slightly offset from the outer one, creating a sense of motion or rotation. The background of the slide features a blue and white striped pattern with a large red arc on the left side.

**ALSTOM**

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