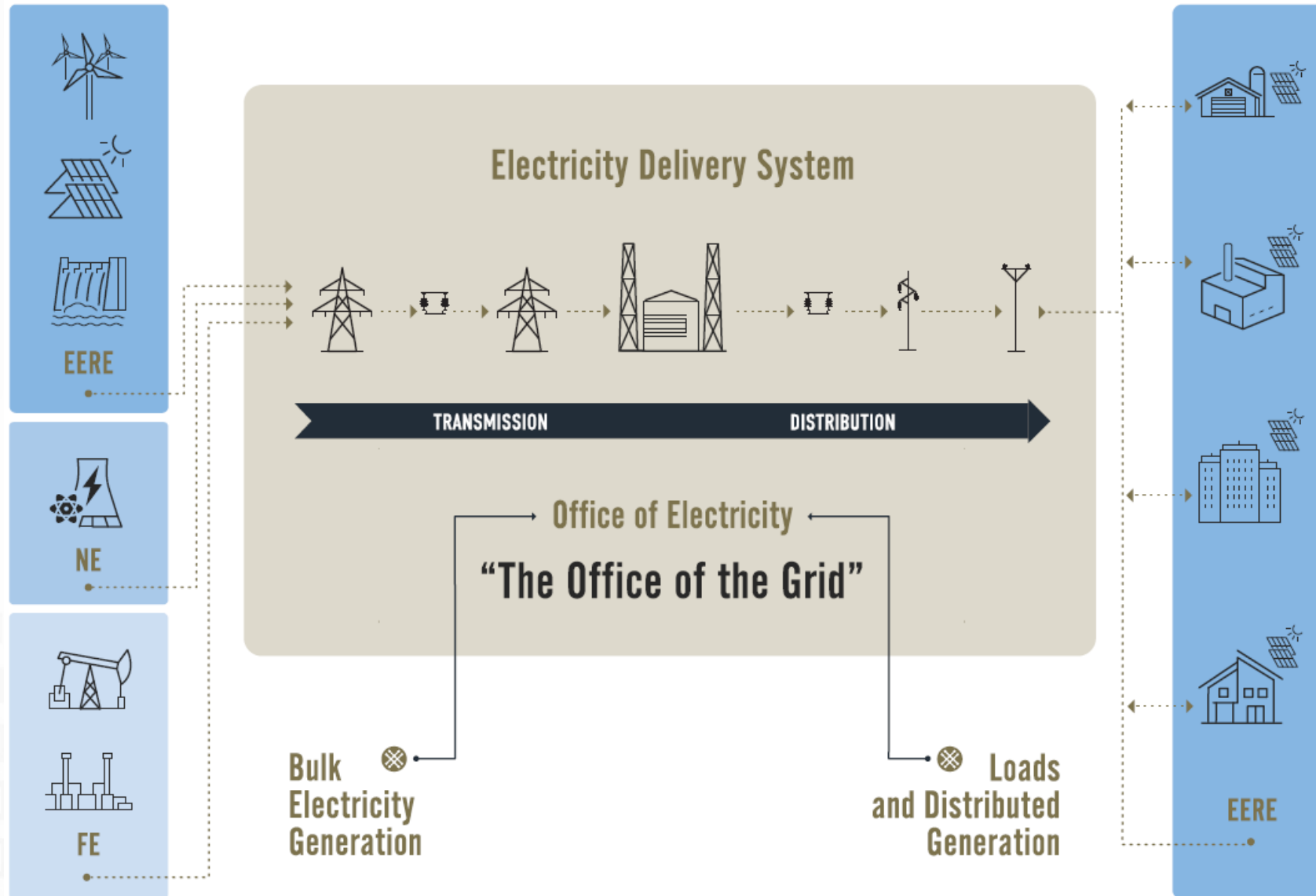


Michael Pesin

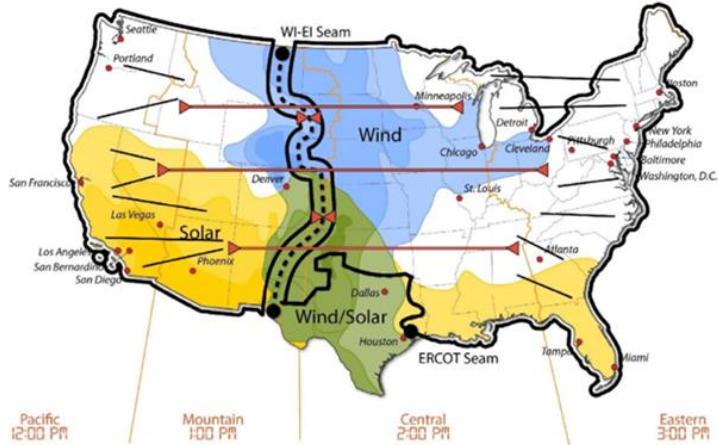
Deputy Assistant Secretary,
Advanced Grid R&D Division,
Office of Electricity



The Office of the Grid



Grid Trajectory Considerations



Loose Coupling
Agile/Flexible

Large-Scale
Generation, High-
Voltage AC/DC Grids
+ Storage

Variable, Integrative,
and Flexible Grid
across TD&C

Next-Generation Electricity Network

- Control of flexible generation and load
- Energy storage
- Synthetic inertia
- Multi-directional power flow
- Varied/variable grid configuration

Capital Intensive
Economies of scale

Capital Diffuse
Network economies

Strengthening the seam between the Eastern and Western Interconnections to encourage efficient development and utilization of U.S. energy resources.

Current Grid

High DER + Complex
Industry Structure

Microgrids are a key part of the future Electric Delivery System, enabling more decentralization and DER integration
Current DER wave: PV, smart buildings
Next DER wave: energy storage, EVs, IoT



Tight Coupling
Rigid/Brittle



Energy Storage R&D

Advanced Materials

Cables and Conductors

Energy Storage Safety and Reliability

Solid State Power Substations (SSPS)

Energy Storage Policy, Valuation, and Energy Justice

MVDC/HVDC

Advanced Grid Modeling

Power Floor Controllers (PFC) and Solid-State Components

Sensors and Data Analytics

ADVANCED GRID R&D PORTFOLIO

Transmission Reliability – Planning/Operations; Observability/Controllability

Advanced, Modular Flexible Transformers

Protective Relaying

Robotics/ Autonomous Vehicles

ADMS

Grid Architecture/T-D integration

Microgrids

Transactive Energy

Buildings/EV-Grid Integration

Load Modeling in OE - AGR&D - AGM

Load Modeling has significant impact on power system studies and is considered essential in power system analysis, planning, control, and operation.

- Office of Electricity (OE), Division of Advanced Grid Research and Development (AGR&D), and Advanced Grid Modeling (AGM) Program support research that:
 - Contributes toward developing and validating mathematical model structure
 - Captures emerging load dynamic behaviors
- Additional research will be required to:
 - Develop physics, math, and economic representations suitable for analytical assessments,
 - Run on a range of computational platforms from desktop to high-performance computing systems
 - Address some of the emerging issues in Load Modeling.

Basic Science Research & Discovery

Application Driven Materials Development

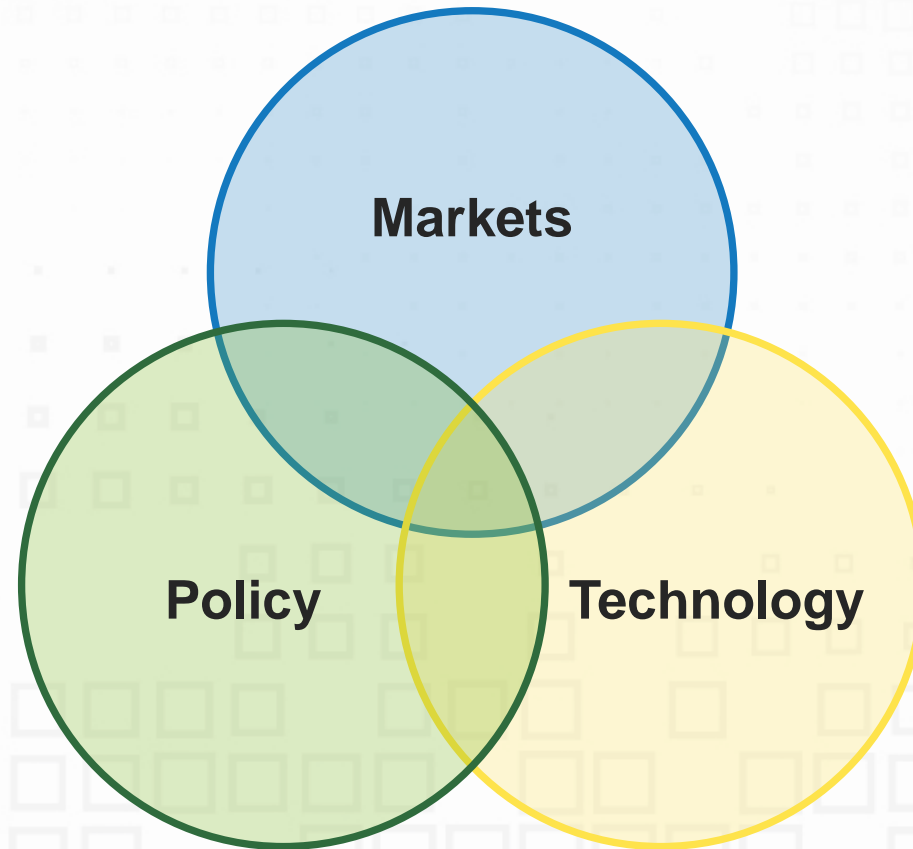
Applied Device and System R&D

Cost & Performance Metrics, Targets

Demonstration and Performance Validation

Systems Analysis and Valuation

Commercialization Strategy



AGR&D Controls Team: Workshop on Dynamic Load Modeling

Purpose: The purpose of the workshop is to both conduct outreach on and receive feedback from industry on OE's research on dynamic load modeling and also to build community among OE's researchers and with industry.

- Specialized means for representing the **short-term behavior** of end-use loads in simulation-based transient stability studies of electric power systems.
- The models describe how loads respond to physical disturbances that affect the reliability of the power system.
- Focuses on representing the behavior of loads over extremely short periods of time (10 or 20 seconds).



Questions?

Load Modeling Projects supported by OE-AGR&D-AGM

Robust Dynamic Load Modeling & Uncertainty Quantification

Interconnection-level Load Modeling for Eastern Interconnection

Open-Source High-Fidelity Aggregate Composite Load Models of Emerging Load Behaviors for large-Sale Analysis

Measurement-Based Hierarchical Framework for Time-Varying Stochastic Load Modeling

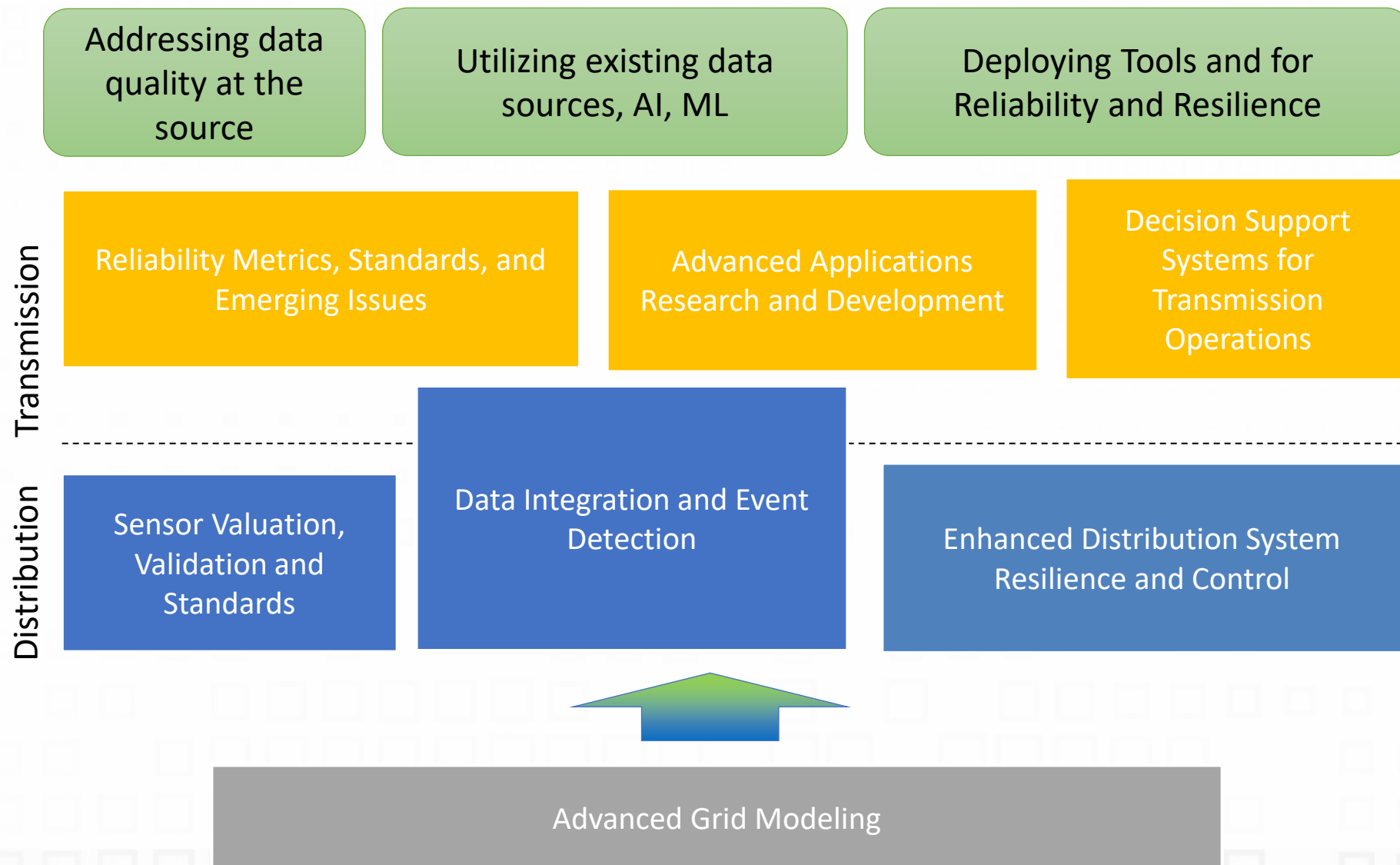
Real-Time Transient Stability Assessment with ML-enabled Composite Load Modeling

Multi-stage Decomposition and Learning for Dynamic Load Modeling and Validation

Load Sculptor: Robust Dynamic Load Modeling and Uncertainty Quantification

Advanced Load Modeling

TRRI, SDA, and AGM distinctions



Coordinating Grid Sensing Projects

