Integration and Big Data

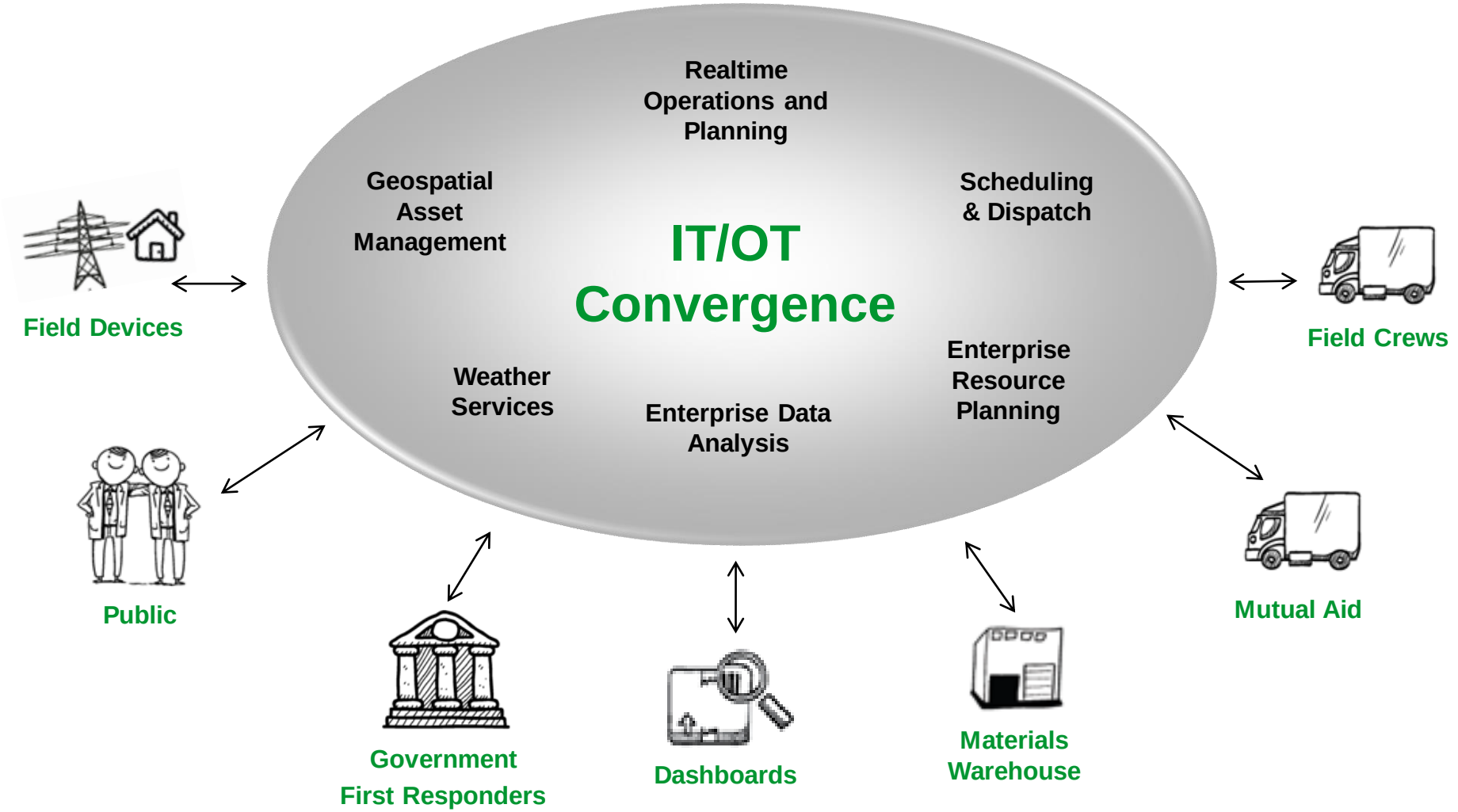
A Centralized Management Approach

The role of data and modelling
in energy systems integration

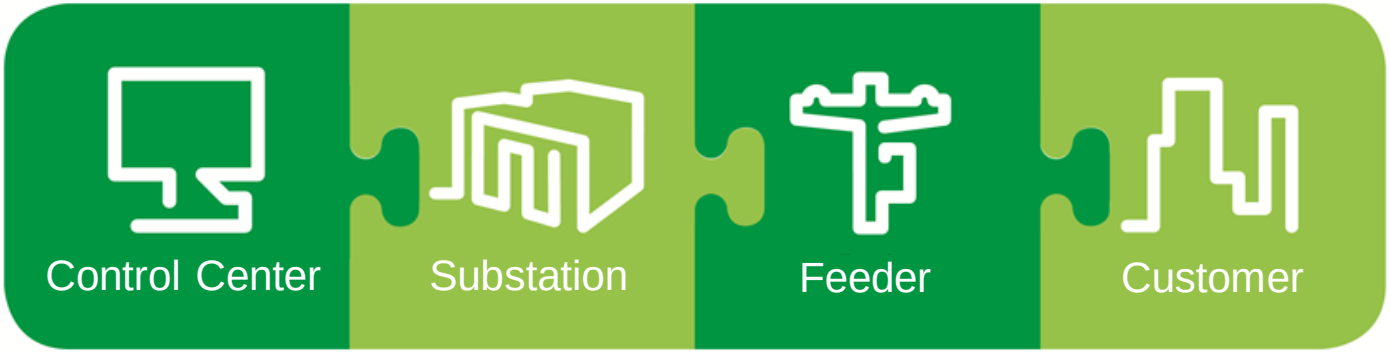
September 9, 2014

Schneider Electric

Convergence of Utility IT & OT



Control Center to Customer



System Resiliency

Storm Management

Network Automation

Demand Management

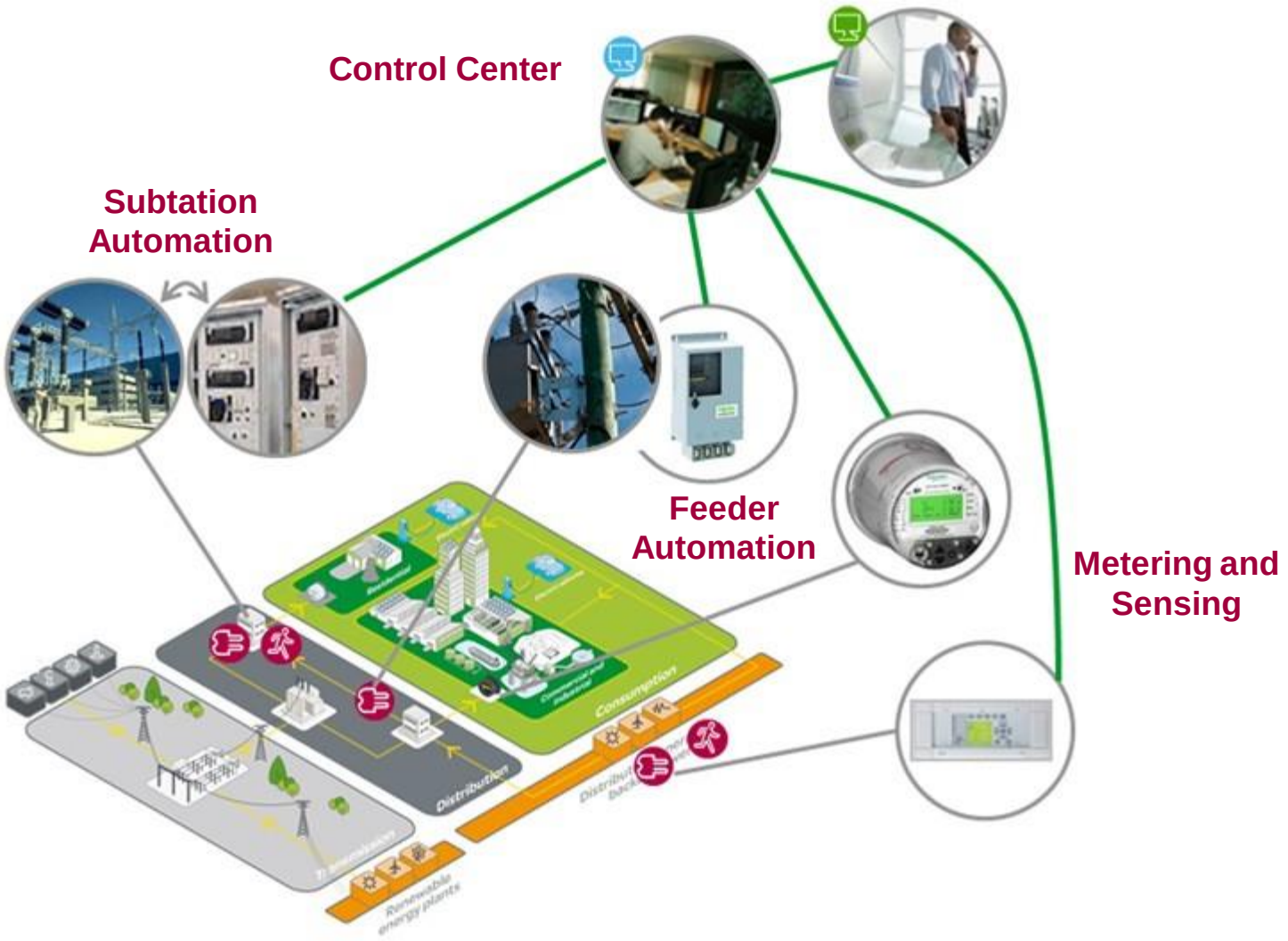
Energy Efficiency

Field Mobility

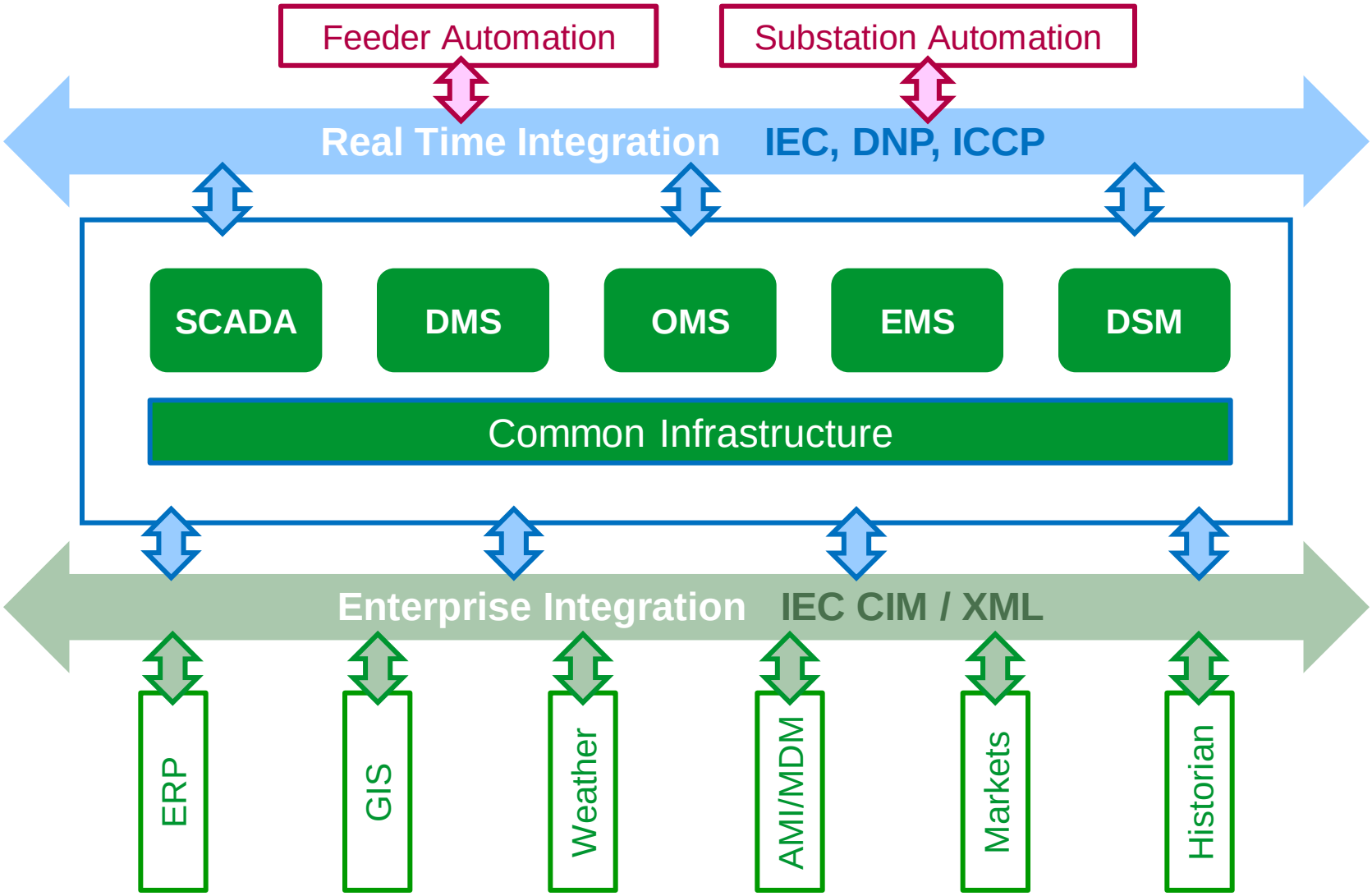
Customer Engagement

Network Automation

Centralized and Distributed Control



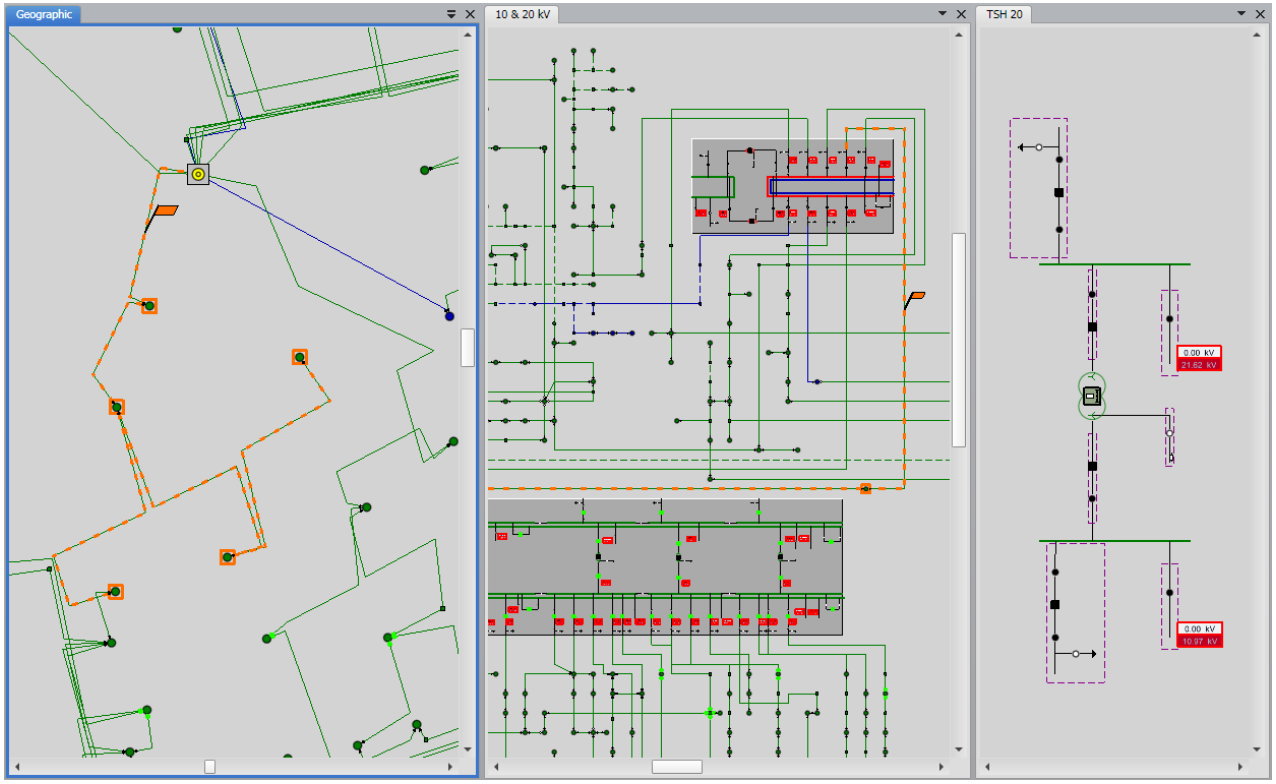
Comprehensive Management



Situational Awareness

Increase Safety and Reliability

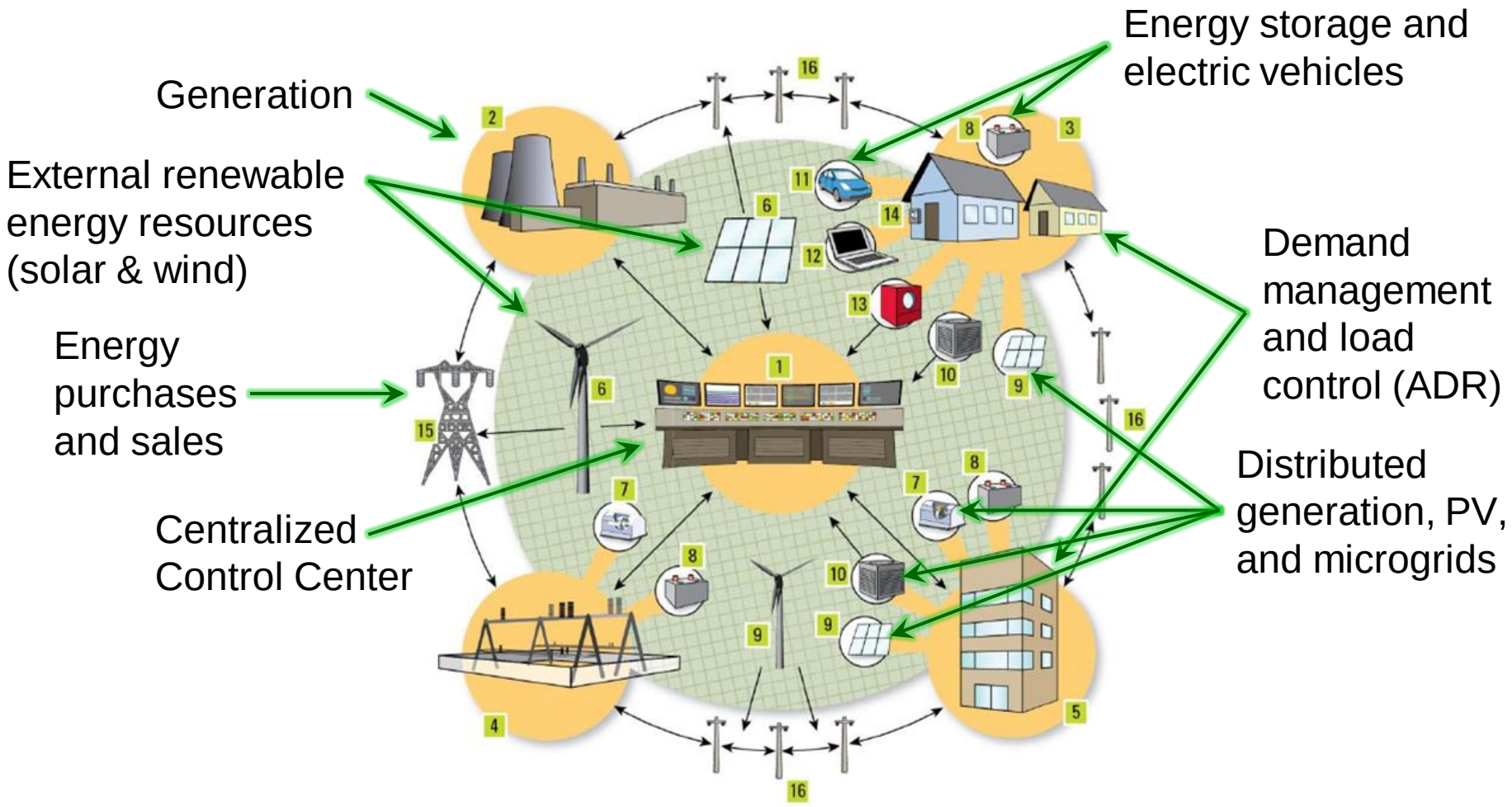
- Multiple map views
- Topology analysis
- Smart alarming
- Event filtering
- Load forecasting
- Simulations
- Historical analysis



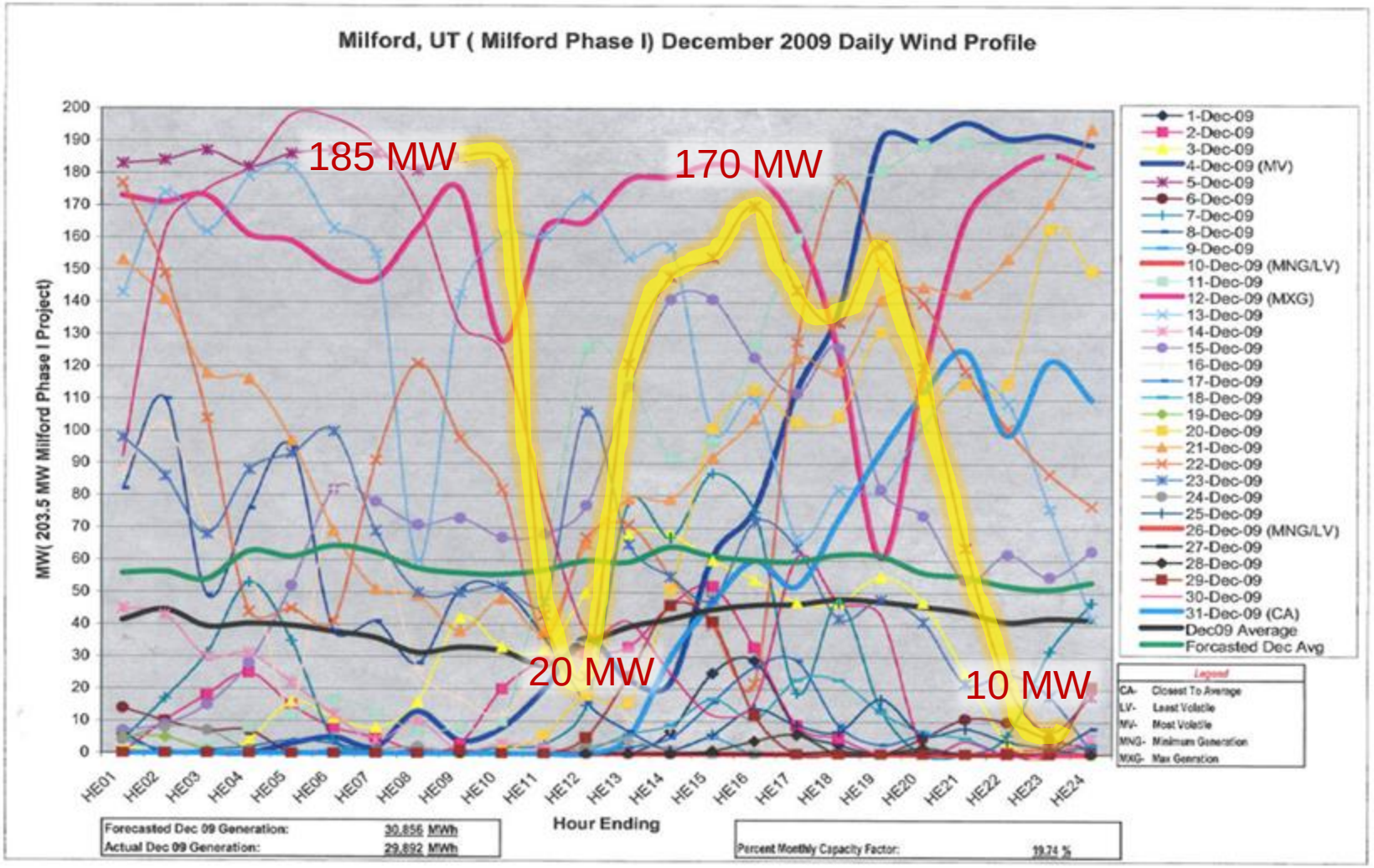
Geographic View | Schematic View | Station View

Automating Dispatchable Resources

Supply-side and Demand-side

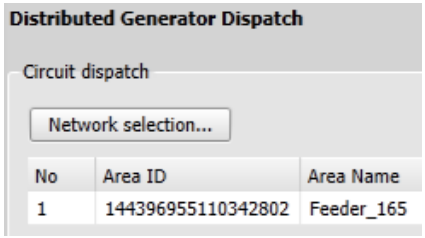


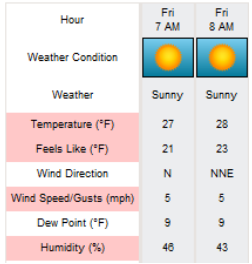
Renewable Resource Variability

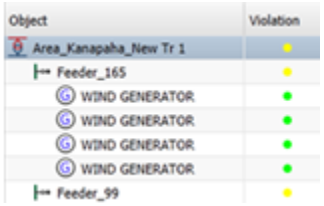


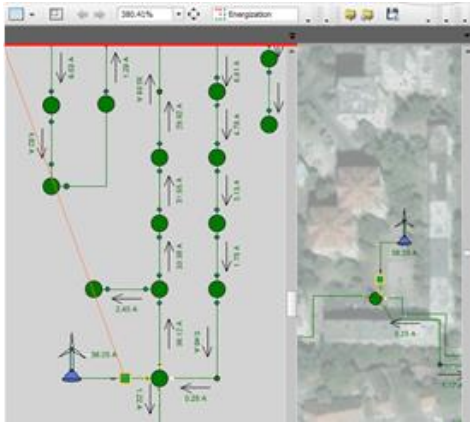
Optimizing the Grid for Demand Mgmt

- Visualization and Monitoring
  - Real-time awareness of DER activity
  - Support operations and planning
  - Conditions-based monitoring
- Reliability analysis and Network planning
  - Near-term, short-term load/power forecasting
  - Integrated weather data
  - Predictive alarming
  - What-if analysis in simulation mode
- Operations and Optimization
  - Reliability and economic dispatch
  - Shaping the daily load curve
  - VVO and FLISR
  - Microgrid management

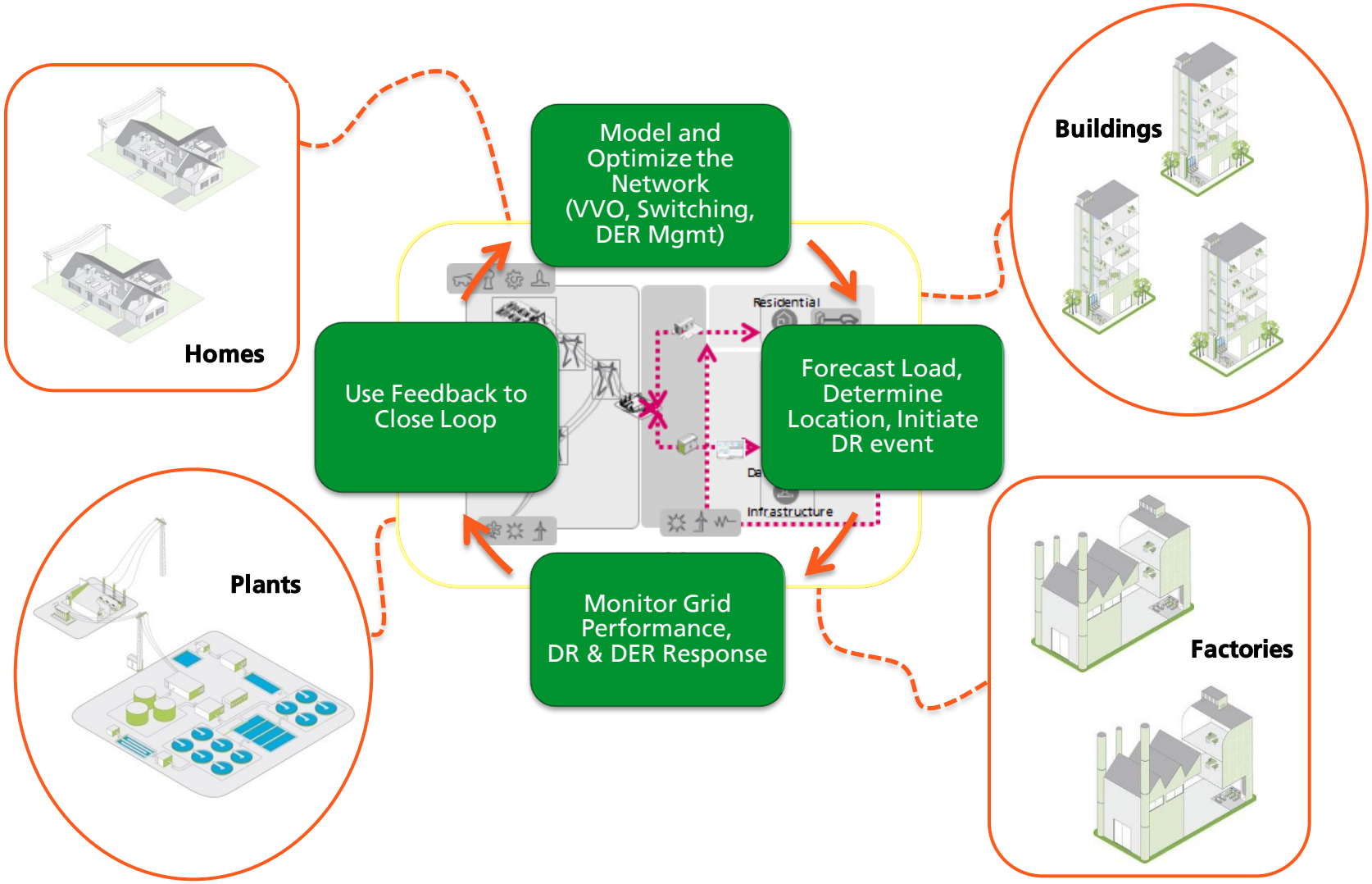








Integrated Demand Response

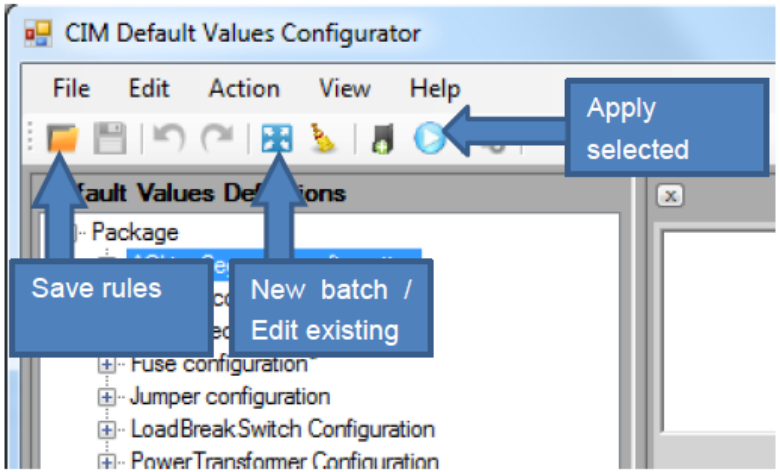


Data Management

Define minimal set of required data

Auto-default unavailable or invalid data

- System of interconnected applications and devices
  - Reduce implementation and maintenance costs
  - Protect technology investments from obsolescence
  - Support minimal data requirements
  - Populate empty attributes in CIM model
  - Define configurable defaulting rules
  - Auto-default data prior to import
  - Support online of offline modes

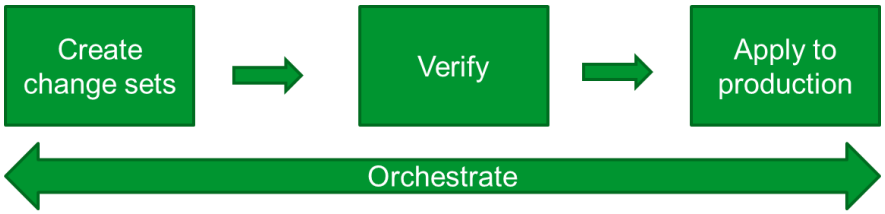


Model Promotion

Securely update network model with minimal effort

Configurable process to support various utility workflows

- Data Import
  - Creation of model changes (change sets)
- Data Validation
  - Validation of model updates (DMD, Builder)
- Data Promotion
  - Promotion of changes to production environment
  - Synchronization of one to many change sets



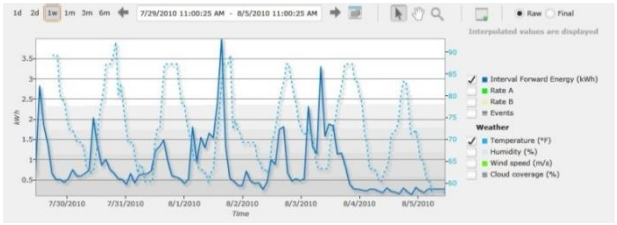
Advanced Outage Management

The Key to Improved Resiliency and Reliability

- Awareness of complete real-time state of the network
- Geographic and schematic views
- Deployment as mission critical system
- Reduced total cost of ownership
  - Infrastructure, Maintenance, Support, Training
- Embedded advanced analysis engine
  - Validation of network operations (check before operate)
  - Automatic creation of switching steps (safety, efficiency)
  - Analysis of dynamic equipment rating
  - Modeling of “cold load pickup”
  - FLISR and Large Area Restoration (crew efficiency)
  - Reduce outage time (prioritization of critical customers)
  - Optimal use of existing equipment

Weather Intelligence

Before, During, After



Improve Prediction

- Load/power forecasting
- Equipment rating
- Adaptive relaying

Speed Restoration

- Alerts & Visualization
- Lightning data
- Crew management

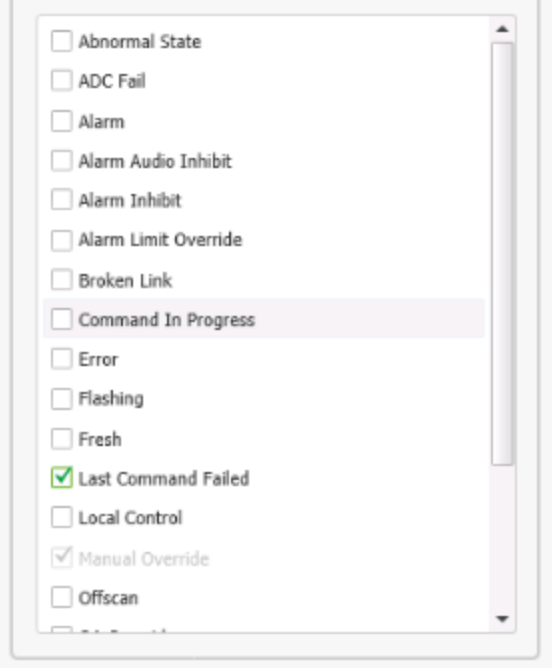
Enhance Analytics

- Outage analysis
- Weather correlation
- Arrestor inspections

Historical Analytics

ADMS providing realtime data

- Easy interrogation and advanced reporting
  - Playback
  - Simulation
  - Load history and forecast
  - Telemetered point values
  - Estimated point values
  - Measurement values
  - Alarming & tagging
  - Temporary elements
- Data transformation to warehouse repository



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