Exelon Utilities Grid Infrastructure Analytics

Smart Grid Edge Analytics Workshop

June 4 – 5, 2019

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ANALYTICS WILL POWER EXELON'S UTILITY OF THE FUTURE

Asset health models proactively notify grid operators about needed maintenance /equipment replacement

Propensity / churn models identifies which rooftop solar customers most likely to use P2P marketplace

Marketing models identify what messages, timing, channels, etc. will best drive community solar adoption

Sensors on streetlights and other devices to monitor air quality, traffic, etc. are rolled into dashboards for Smart Cities managers

Intelligent traffic signals use historical data and routing algorithms to minimize commuting times

Models suggest where EV charging infrastructure is most needed and how many charging stations to install

Vegetation management models prioritize and optimize jobs, routing, etc.

Electrification propensity model can prioritize which companies are most likely to electrify

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EU ANALYTICS VALUE STRATEGY FOCUSES ON 4 DOMAINS

Customer

Smart Energy Services

Online tools & notifications will drive
3.1 Terawatt hours
of customer savings
Enough to power more than 300,000 homes for a year!

Customer Operations

Use Cases across...
1. Customer Strategy
2. Customer Operations
3. Revenue Cycle
4. Products & Services

...that will:
- Enhance cust. experience
- Automate low value interactions

Grid

23 Use Cases across...
1. Asset Management
2. Grid Operations
3. Extended Systems

...that will:
1. Improve Reliability
2. Improve Customer Sat.
3. Reduce O&M Expenses
4. Capture new Revenue

Grid

Advanced Metering Infrastructure

33 Use Cases across:
1. Meter Operations
2. Network Operations
3. Theft Detection
4. Inactive Meters

New Use Case Pipeline – Job One Focus on Safety

Data Analytics Platform (DAP)

Strategy | Gov. & Planning | Domain Execution | Analytics Delivery & Support | Culture Shift | Value Tracking & Realization

Accelerating EU Analytics Maturity & Culture

EXELON UTILITES
ANALYTICS ACADEMY

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GRID ANALYTICS SUMMARY & OBJECTIVES

DATA
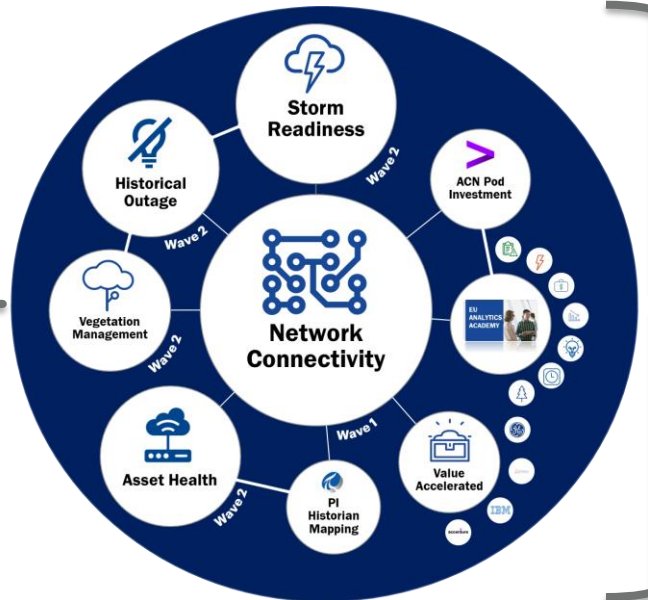
- Asset data
- Inspection data
- Outage information
- Historical & forecasted weather
- Crew information & location
- Time series data
- Asset alerts & alarms
- Meter reading & event data
- Vegetation trim cycles
- Financial data

ANALYTICS

Network Connectivity

Storm Readiness — Wave 2

Historical Outage — Wave 2

ACN Pod Investment

Vegetation Management — Wave 2

EU Analytics Academy

Asset Health — Wave 2

PI Historian Mapping — Wave 2

Value Accelerated — Wave 1

INSIGHTS

- Optimal reliability program recommendations
- Asset maintenance effectiveness
- Asset life predictions
- High risk assets & circuits
- Storm damage prediction

- Storm damage prediction
- ETR calculations
- Asset failure signatures
- Network connectivity data quality
- DER load forecasts

Reduce Operational Costs	Increase Revenue
Improve Reliability	Reduce System Risk

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NETWORK CONNECTIVITY USE CASE

Network Connectivity constructs a digital twin of the electric grid as a foundation to maximize the value of grid analytics across EU
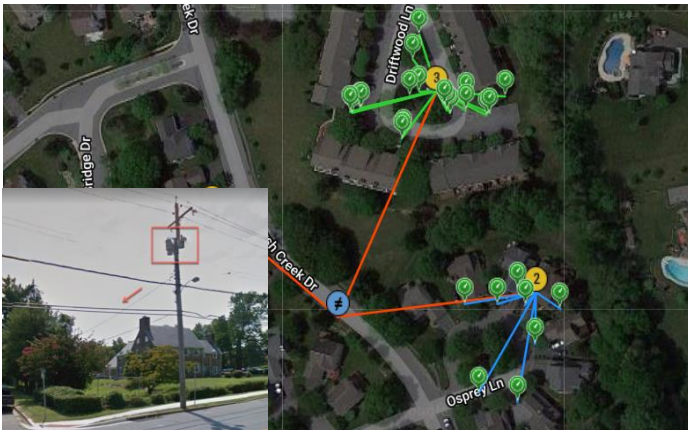
Digital Twin of the Utility Grid

- Foundation for all future Grid Analytics use cases
- Dynamic user interface with multiple map layers and filters
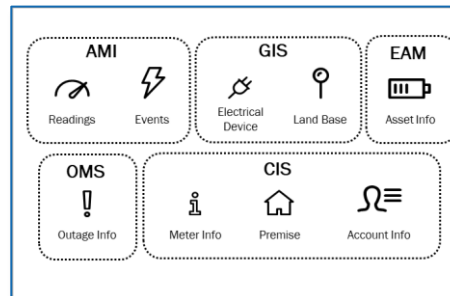- User & automatic network corrections

Identify mismatched **Meters to Transformers** and **Transformers to Feeders** across all of Exelon Utilities

Reduce **Falsely Reported Customer Interruptions** to improve operation and reliability

Core T&D Data Sources Ingested

Analytics Self-Correct Data Quality Issues

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STORM READINESS USE CASE

Storm Readiness Analytics uses machine learning for high resolution damage prediction models to drive improvements in reliability and customer satisfaction
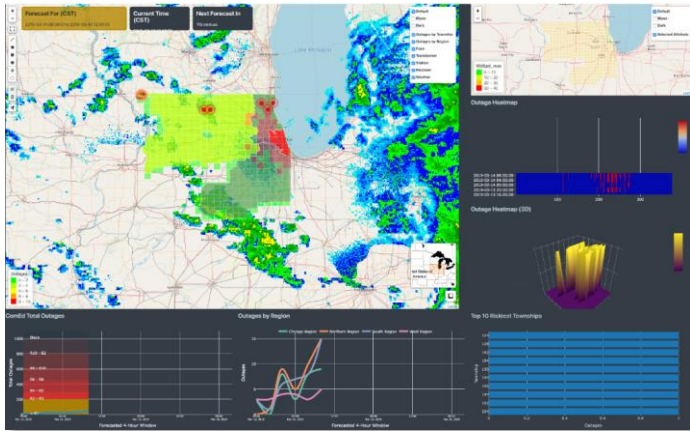
Machine Learning for Storm Response

- Damage Prediction
- Staffing Level Recommendations
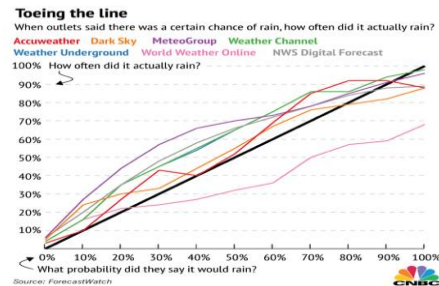- Pinpoint Crew Placement
- ETR Estimates

EU Annual Storm O&M is one of the largest expenditures across all of the Operating Companies

Reduce **Customer Interrupted Minutes Per Year** by leveraging data analytics for storm response

Leverages best in class weather forecasts

Tool will support our dedicated Emergency Response Teams

EP TEAM–
"We can't wait to start using this tool!"

"This will provide better resolution on the actual weather that caused the damage"

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ASSET HEALTH USE CASE

Integrate real-time asset condition data from intelligent devices with static data sets (preventative maintenance, corrective maintenance, reliability history) to move from time/ failure based maintenance and replacement strategies to condition/ risk based maintenance and replacement strategies

Asset Health and Risk Analytics

- Real Time Asset Condition Data
- Robust Asset Health & Risk Scores
- Failure Mode Tracking
- Dynamic Asset Strategies
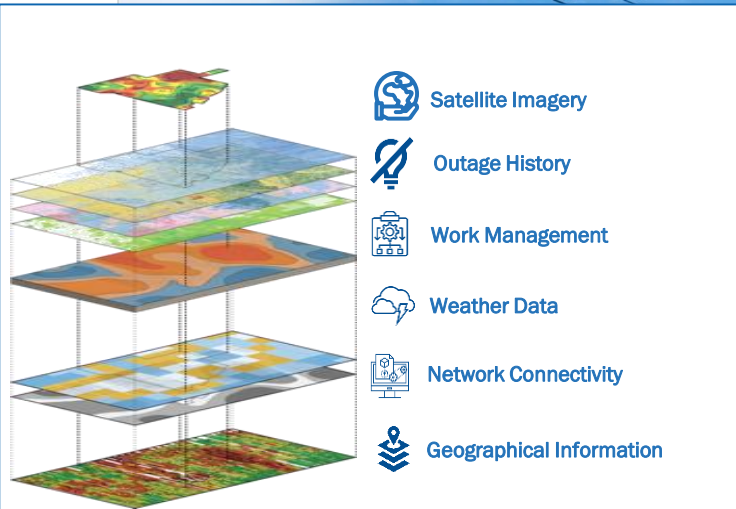

Risk Algorithm Design

Reduce the impact to customers and the cost of reactive maintenance

Geo-spatial Asset Analysis

Financial Analysis and Cost Benefit Tools

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VEGETATION MANAGEMENT USE CASE

Vegetation Management Analytics will offer a data-driven approach to enable smart contracting and transform the way EU manages vegetation risks

- Satellite Imagery
- Outage History
- Work Management
- Weather Data
- Network Connectivity
- Geographical Information

Innovative Analytics for Smart Vegetation Management

- More efficient data-driven work planning
- Vegetation risk management & smart contracting
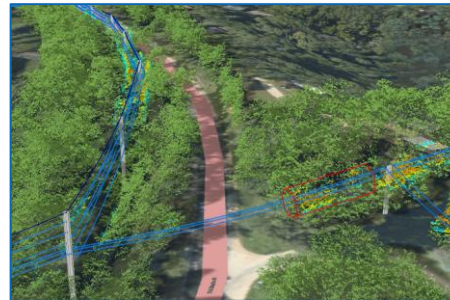- Reduced vegetation related outages

Managing vegetation is one of the highest priorities due to customer impact and O&M spend

Vegetation related outages has significant customer impacts, accounting for more than 24% of All Outages

Targeting high-cost LiDAR solution

Risk identification using low cost satellite imagery

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