



# UA Summit<sup>®</sup>

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Hosted by **Entergy**

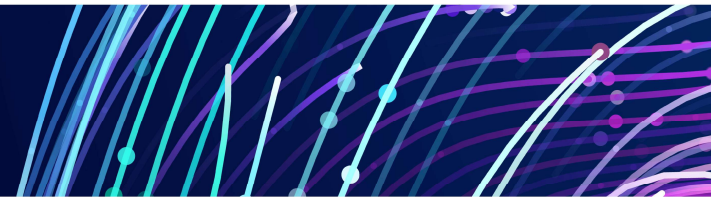
## **Advanced Analytics –**

The Role/Impact of Exponential Technologies

Frank Hoss, IBM      Josh Power, Oncor

# Agenda

- Introductions
- Industry Drivers
- Enabling Technologies Overview
- Application of Enabling Technologies in AMI
- Q&A



# Introductions



Frank is the IBM Lead Client Partner for Energy and PSEG. He is an experienced, hands-on, professional consultant, working at the intersection of business & technology to address recent technological and economic changes, and increasing customer demands that are challenging companies.

Deep Utilities Industry business knowledge (35+years), bringing meaningful insights, along with a proven track record of successfully delivering projects and implementing enabling technologies, to achieve transformative business outcomes.

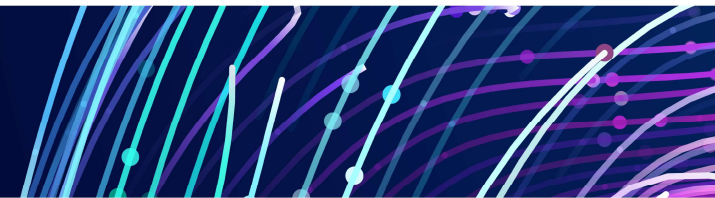
Delivered complex, major system integration projects, working in rapidly changing environments. Focused on grid modernization/ AMI, digital innovation, analytics and mobility to achieve these transformative business outcomes.



Josh serves as Capability Lead – Data, Advanced Analytics, Automation, and AI at Oncor Electric Delivery. His organization is responsible for enabling the development, delivery, and operations of next generation technologies and platforms to support digital transformation at Oncor.

Josh has been with Oncor since 2016 serving in various leadership capacities in the Technology organization. He has served in his current role for the past year.

He has 20+ years of IT experience, including 13 years of experience as an Energy focused IT consultant prior to joining Oncor.



# Industry Drivers



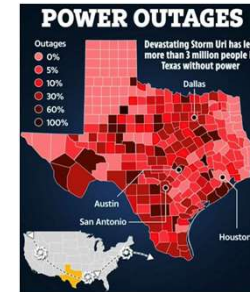
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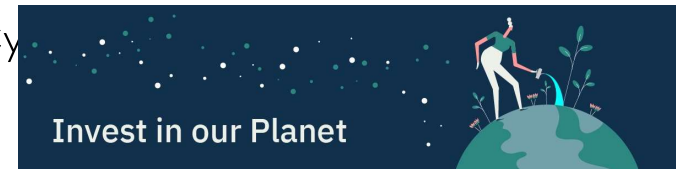
*At Entergy, we've had the privilege of providing safe, affordable and reliable energy that has powered millions of lives for more than a century, but we're not resting there. We are proactively transforming our company to meet new opportunities. We're evolving to ensure Entergy becomes a driving force for innovation and cutting-edge products and services. And we are accelerating our efforts to reduce carbon emissions, while partnering with our customers to support their own environmental goals, leading to a cleaner and better future for all our stakeholders.*

- LEO DENAULT, ENTERGY CHAIRMAN AND CEO

- Growing Energy Demand
- Adoption of Environment Policies & Regulations to Combat Climate Change
- Consumers expect Greater Reliability/Higher Quality for Digital Devices
- More Frequent / Major Events – Severe Weather, COVID
- Adoption of Sustainability Initiatives
- Security – Ensuring against Cyberattacks



2020 Texas Deep Freeze

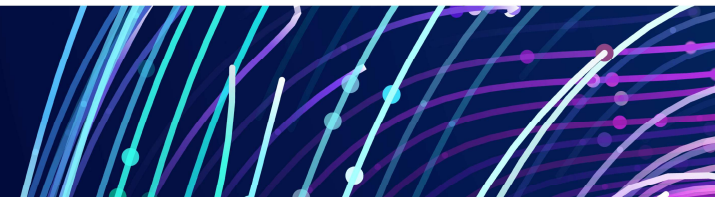


The Utility Industry is facing some very Transformative Challenges...

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# Exponential Technologies Overview



## EDGE COMPUTING

- Allows data processing to occur in devices where data is collected, and actions performed
- Frees up bandwidth on communications infrastructure
- Reduces/Eliminates Latency concerns



## 5G/PRIVATE LTE

- Bandwidth, Latency, Proprietary Technologies and Network Design have all limited the potential of Advanced Analytics
- Offers greater security, speed and bandwidth
- Foundation for Smart Grid Operations, DERs and other IoT technologies to connect and support Utility Operations and enhance Customer Engagement



Technology Specific ERP

For Cloud-based Platforms, IBM research found out that:

- 52% will pursue secure information sharing between energy ecosystem participants
- 29% will focus on enabling collaboration between interoperable networks
- 57% will provide e-mobility services
- 43% will develop marketplaces for energy services
- 45% intend to enable provision of DER grid

Twitter: @weareuai

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## AI

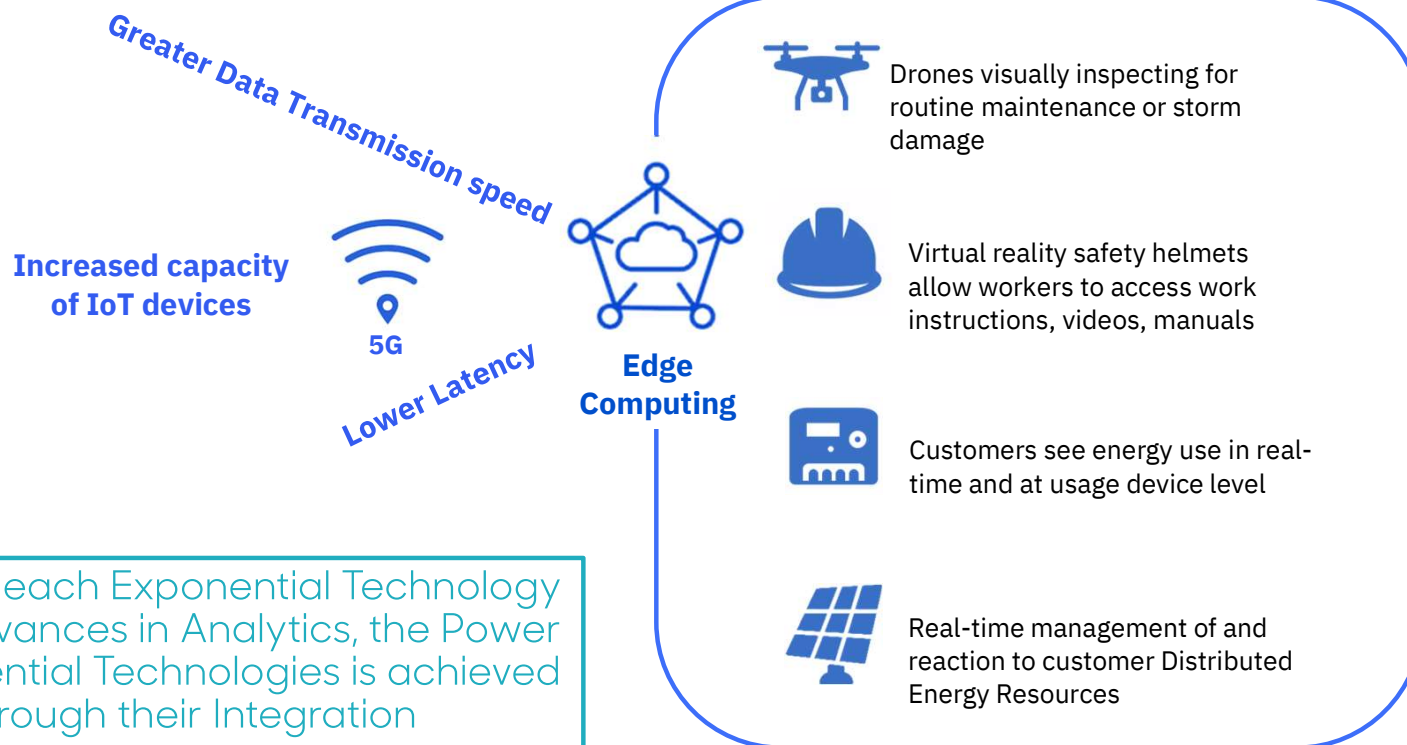
- Planners, Engineers, Data/Business Analysts, CSRs are digging into data, pairing it with other data, asking more questions, gaining insights and making data-driven decisions
- Offers the ability to embed informed decision-making and advanced analytics into the analysis of data



## IoT

- Allows Utilities to potentially expand sensing and control to the very ends of their Grid
- Opens the possibilities of going "Beyond the Customer's Meter"

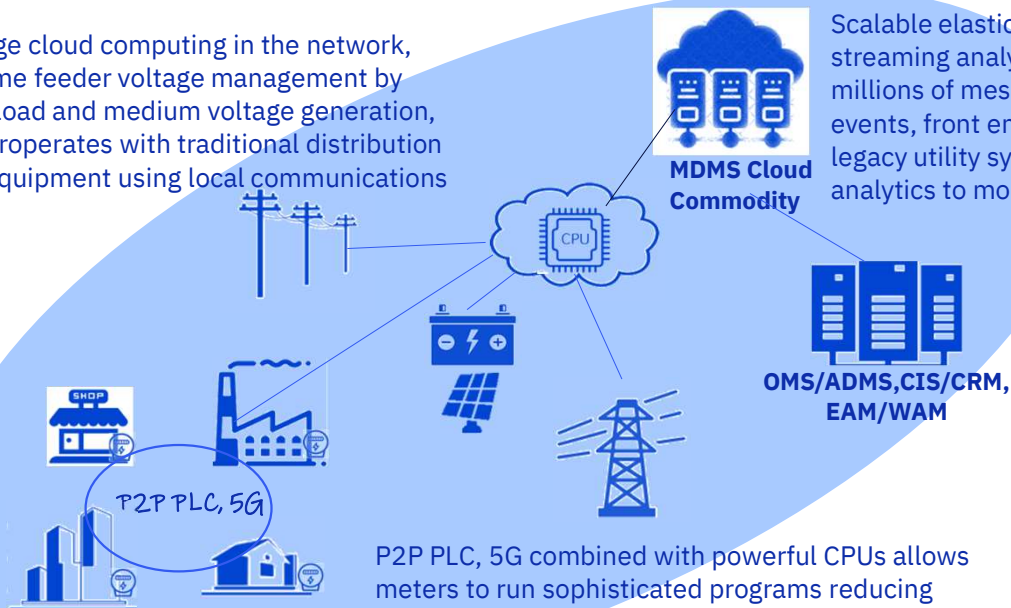
# Application of Exponential Technologies in AMI



Although, each Exponential Technology brings Advances in Analytics, the Power of Exponential Technologies is achieved through their Integration

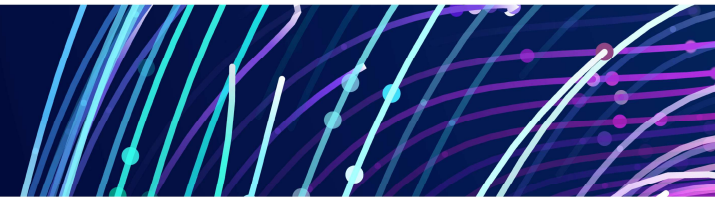
# The next generation of Utility networks will be powered by EDGE computing over 5G networks enabling real-time assessment of Grid conditions

5G allows edge cloud computing in the network, allows real time feeder voltage management by coordinating load and medium voltage generation, securely interoperates with traditional distribution automation equipment using local communications



Scalable elastic IOT cloud capabilities enable streaming analytics to digest and process millions of messages in real time during major events, front ending and protecting critical legacy utility systems while feeding AI driven analytics to mobile field applications

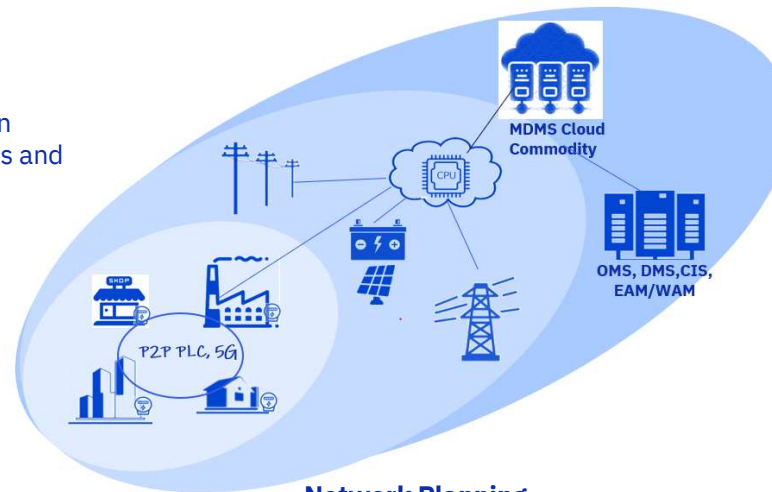
P2P PLC, 5G combined with powerful CPUs allows meters to run sophisticated programs reducing the need to leverage backend systems. They can coordinate load and DER generation, disaggregate behind the meter load, profile and correlate power use and power quality events



# Edge solutions, AI and 5G will enable advanced analytics based on real-time sensors and create new areas of value for Network and Customers

## Network Operation

- Loss of Neutral/Fault Detection
- Use AMI data to identify wire down situations to prevent potential fires and accidents
- Operating de-centralized systems (Islanding, micro-grids)
- Accurate load prediction with time series AMI data and events
- Forecasts correlated with weather and traffic, etc.
- Electric phase identification and imbalanced load determination
- Underground Cable Failure Analysis
- Grid Interactive Efficient Buildings (GEBs)
- Predictive Asset Lifecycle Maintenance and Inventory Control



## Network Planning

- Probabilistic models and simulations throughout the distribution network
- Increase higher load grid average and decrease disturbances/outages
- Demand-based Network Planning
- Enhanced connectivity model

## Enhanced Customer Benefits

- Electrical Vehicle infrastructure
- Energy Efficiency (power, heat, water)
- Load applications
- Billing of additional services
- Personalized insights and customized product offerings
- Empowered home solutions
- Simplified tariff analysis
- Load Disaggregation enabling end use pricing
- Increased energy democratization



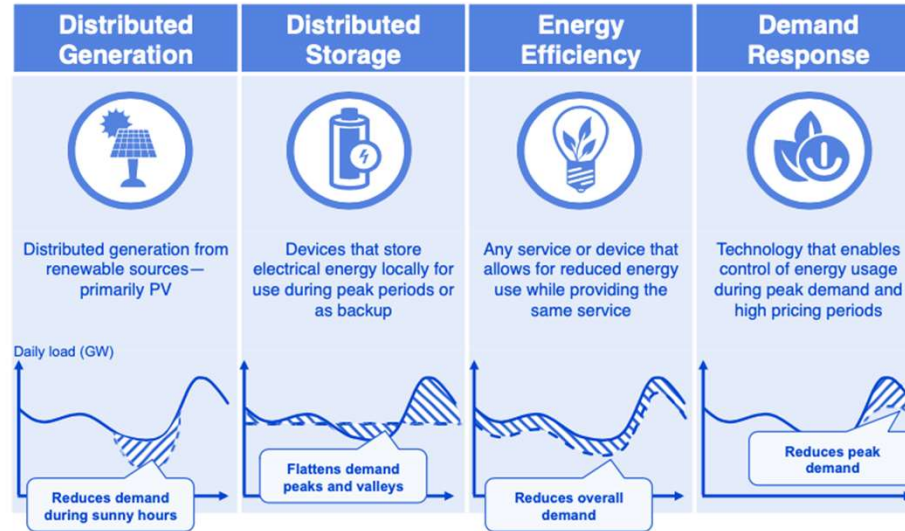
# Decision support for Grid Optimization and DERs will be based on Predictive Analytics fueled by near real-time AMI data

## Grid optimization use cases

- Supply/Demand security on all voltage levels
- Manage Congestion management (dispatching)
- Keep Grid stable (frequency, voltage) despite renewable
- Optimize utilization of grid capacity

## Distributed Energy Resources use cases

- Distributed generation
- Distributed storage
- Energy Efficiency
- Demand Response
- Load and Feed-in Management
- Microgrids and VPP (Virtual Power Plant) Management
- Ripple Control (heating, heat pumps, ...)

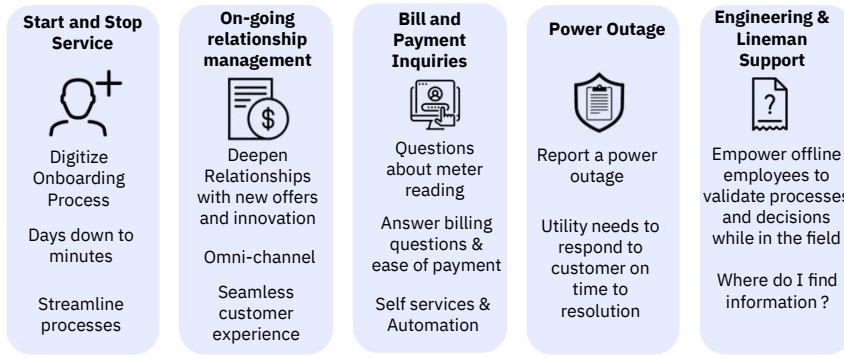


# Advanced Analytics and can be used now across Grid Operation and Customer Service to create intelligent workflows to create significant value

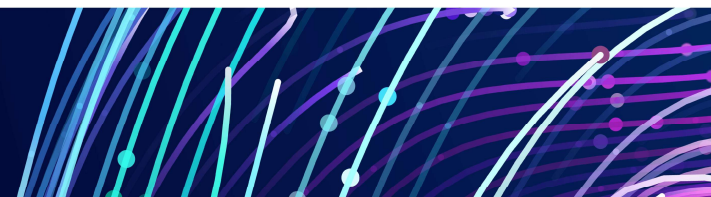
... (AI) achieving incremental but **tangible outcomes** with intelligent workflows-more **efficient business operations**, more **compelling customer experiences** and more insightful decision-making . . . .

- "Proven Concepts for Scaling AI", IBM Institute for Business Value (IBV)

## Customer journey touch points



## How Watson can help automate and improve touch points



# Several Utility Advanced Analytics Exponential Technologies Examples

AI Management of EV Charging – Ontario IESO, OEB and Hydro Ottawa

- At 1 in 4 Customers adopting EV, Peak Demand is expected to increase up to 30%
- Goal is to save Customers money and extend the life of the Distribution Grid Infrastructure

Source: Watch: Utility looks at how AI can help Manage EV Charging; PowerGrid International; April 18, 2022



EV Charging in Ottawa. Image credit: Informational video about EV Everywhere program. Source: Hydro Ottawa.

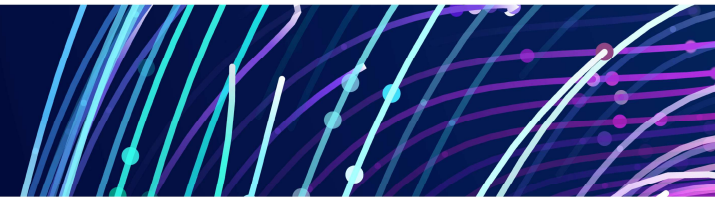
Conservation Voltage Optimization (CVO) – Consolidated Edison

- Reduces the amount of energy required to provide adequate electric service, thereby decreasing energy generation, operating costs and overall CO<sub>2</sub> emissions
- Integrating 15-minute interval data from AMI with data from 27 enterprise source systems, creating 800 billion new rows of data per year (or 2.2 billion a day), across a total of 3.4 million electric meters

Source: Con Edison Expands New Advanced Analytics and Enterprise AI Applications on the C3 AI Suite; Businesswire; May 26, 2021

Additional Consolidated Edison Examples

- Grid Modernization – Identification of Abnormal Neutral Leg Voltages
- AI-based Revenue Protection
- “Hot-Socket” Monitoring



# Q&A

*For further information, contact:*

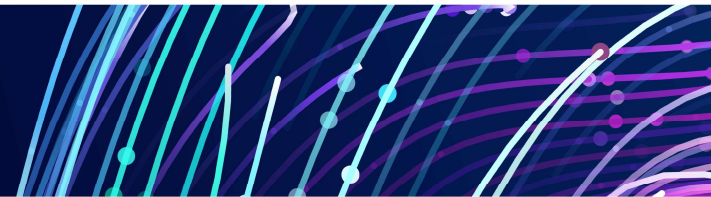
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