Using Data to Improve Business Processes

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Session Agenda

- AMI Journey
- Opportunities and Challenges for Change
- Tools & Concepts with Trynzic
- Use Cases/Scenarios
About Huntsville Utilities

Huntsville Utilities is a not-for-profit, public utility owned by the City of Huntsville, Alabama serving the residents of Huntsville and Madison County. We currently have approximately 213,000 electric, 105,000 water, and 62,000 natural gas customers.

Our mission is to strengthen trust in Huntsville Utilities, our vision is to deliver excellent customer experiences, and our values are to do what’s right, build community, and get better every day.

About Trynzic

Our vision is simple. To bridge the gap between IoT data and smarter business processes, no matter the industry. Trynzic is the premier IoT platform for event-driven work.

Built on Microsoft Azure, Trynzic's software platform combines a scalable architecture and serverless computing to give Customers an affordable way to sense, triage, and act upon a myriad of issues in their grid.
Bios

Keith Hogan is an Engineer II at Huntsville Utilities in Huntsville, AL. Keith is from Athens, AL about 30 minutes west of Huntsville, AL. He started with Huntsville Utilities as a summer hire right out of high school and continued working at Huntsville Utilities throughout college as a Co-Op student. After graduation, he took a job at Arab Electric, Inc in Arab, AL where he was promoted to the Assistant General Manager. Keith has been back with Huntsville Utilities for the past 6 years working as the Project Engineer on their AMI deployment project. Keith has 15 years of experience in the public power industry in both the municipal and member owned cooperative settings.

Jeremy Indridason is Vice President of Products & Services at Trynzic, which brings the serverless computing power of the cloud to use your data to identify and prioritize anomalous events, and execute business processes that enable meaningful digital transformation.

In his role at Trinzic, Jeremy leads the Product Management, Software Engineering and Services organizations, focusing on collaborating across the industry to get the best ideas to market and delighting customers with extraordinary customer experiences – closing the gap between AMI and ROI.
AMI Journey
Typical AMI Journey

**START**

- Business case development.

**Governance**
- Technology selection.
- Scheduling.
- Program definition.
- Stakeholder impact assessments.

**Planning**
- Meters and related software deployed in the field.

**Billing Cutover**
- Revenue fully driven by monthly usage reads.

**Deployment**
- Meters and related software deployed in the field.

**FINISH**

- Digital Transformation
- Smart Grid
- Real-time

**Innovation**
- Meter to Cash:
  - Protect Billing
- Non-Real-Time Use Cases:
  - Customers can see usage
  - Reports

- Smart Grid?
HU AMI Journey

Assumptions

• Three-year deployment with Electric, Gas, and Water AMI endpoints being deployed together with Gas and Water lagging behind only one month.
• Requested bugs, hot fixes, etc. would be fixed each upgrade cycle
• New water pit module delivery
• Customer Service Entry Repair

Promised Outcomes

• Access to granular customer usage data
• Reduced truck roll costs for disconnects for non-pay
• Usage insight prompting proactive alert notification to customers
• System performance and alert notifications

Reality

• Rollout is 5 years on-going
• Data and business process is harder than you realize
• Ever changing business environment adds complexity (internal and external)
• Big data requires new skills and new tools
Challenges & Opportunities

Challenges

- Data Silos
- Unchecked meter events / noise / alert fatigue
- Difficulty integrating different systems that own the data
- Tracking and optimizing processes and workflows
- Identifying bottlenecks and inefficiencies in manual administration tasks
- IT required to generate reports for every analysis performed

Opportunities

- Combine pertinent data from different systems into one place
- Clear the clutter and focus on the important alerts by tailoring alert parameters to utility specific desires
- Establish dynamic workflows across multiple departments to drive to the end goal without dropping items.
- Run analytics to identify the inefficiencies across all systems and departments based on completion times of action items in process workflows
- Give non-IT employees the tools to query and report on the data they need with relative ease
Tools & Concepts
Trynzic for Utilities

We are the bridge...

... between the smart meter...

...and the smart grid

Smart

Processes

Data
Current State

Advanced Metering Infrastructure

Utilities are businesses with processes.

~4 hours on the meter

Sit until EOD in the head-end system

Processes informed with some grid conditions that previously occurred.

Batch data transfers

Periodic report reviews

Traditional Data Analysis Tools
Path to the Future

Advanced Metering
- AMI Meters
- Backhaul
- Software (head end, etc.)

Use Case

Dept

- Integration engine
- Canonical enterprise data model
- Scalability
- Compute & Storage Cost control

Business Processes
- CIS
- MDMS
- Field Mobile
- OMS
- GIS
- Analytics (BI)

- Workflow engine w/ designer
- Orchestration engine
- Case management
- Collaboration
System of Systems

OT
Operational Technology
“software that interacts with hardware”

- Head End Systems
- SCADA
- Data Communications

IT
Information Technology
“software that does real-time things for people”

- CIS
- MDM
- GIS
- OMS
- Billing
- Work Orders

Analytics
“looking at history”

- Data Lake
- Excel
- Power BI

Trynzic enters here
Consume high-volume OT data streams
Orchestrate real-time data to business processes
Enrich your analytics capability

Combine with departmental data
Together with Trynzic, rapidly configure and validate real-time events and business processes to quickly realize value from your AMI Data.

Go Live is just the beginning - with Trynzic your team is in full control. Continue to improve your operations and grow your AMI investment as fast as you need!
## Iterative Approach in Reality

**Digital Transformation in Action!**

### 2022

#### MAR
- **Kick-off, Data Integrations and Configuration of Starting Scenarios**

#### MAY
- Starting Scenarios
  - Meter Out of Communications
  - Temperature Alarms
  - Tilt/Tamper Alarms
- Missing Intervals Detection
- Managed Accounts Outage Notification

#### JUN
- Reverse Rotation Detection
- Connectivity Model: Meters too far from Transformers
- Missing Data Detection

#### JUL

#### AUG

#### SEP
- Router Low Battery Detection

#### OCT
- Router Outage Detection

#### NOV
- Meter Installed w/out Service Order Detection

#### DEC

#### JAN
- **Voltage Out of Range**

#### FEB
- **Transformer Utilization**

### 2023

- Idea
- Realized!
Data Volume Challenges

250,000 electric meters

- Hourly usage reads
  - 6M data points / day
    - (beyond Excel, you are in relational)

- Hourly voltage
  - (min/max/avg)
  - 24M data points / day
    - ('real work' for relational)

- Keep data for 2 months
  - 1.4B data points
    - (now you are in non-relational, aka big data)

Now apply the data to dozens of detection rules combined with other data from departmental systems.

Now you have an impressive IT challenge

IoT Cost Curve

The closer you get to 'real time', the more difficult it is to contain infrastructure costs.

Trynzic

“Some of software's best work goes unseen!”

Data Volume/Velocity

Technology Cost

IoT Cost Curve

The closer you get to ‘real time’, the more difficult it is to contain infrastructure costs.
Trynzic’s BI Strategy

Ingest

Bring your data from Trynzic to an Azure subscription you control

Store

Saved in a cost effective, long-term data store

Prep & Stage

Aligned to Trynzic data standards

Self-Service

Made available to your reporting tools and existing investment

Your Enterprise Data (H/E, CIS, etc.)

Trynzic's Data (Events, Actions & Case)

Your Azure Subscription

Azure Data Factory

Azure Data Lake

Azure Synapse

Azure SQL

Tableau

Power BI

Azure Data Bricks
Analytics Pilot

Problem Statement

The difficulty of being able to access critical business data in a consistent, centralized manner is creating barriers to innovation and productivity across multiple areas of the business.

Scope

The focus of this project proposes to do a pilot of data aggregation that leverages existing efforts already accomplished with the vendor Trynzic and its software platform.

Goals

- **Big Data in the Cloud**
  - Leverage the scale of cloud technologies to build common repository of data

- **Start the Community**
  - Identify a small community of power users for learning and experimentation

- **Show what we can do**
  - Target 3 references reports or dashboards to be built

- **Build Plan for Next Steps**
  - Leverage pilot learning to build a program roadmap for change

Benefits

- Enables data access across multiple siloes/systems that is not cost effective today
- Begins common standards and understanding of data
- Limited pilot proves the concept before broader investment

Key Risks

- New technology and assoc’d learning curve
- Technology aspects of data governance could get ahead of organization and culture changes and result in re-work

Critical Milestones

- **Setup Cloud Resources**
  - Storage, compute, and ETL for cloud data

- **Build the Experiments**
  - Identify the small group of SMEs build time-bound experiments

- **Review & Assess**
  - Review experiments and build plan on go forward plans

- **Future State Roadmap & Roll-out**
  - Build the roadmap of next steps and incorporate into planning cycle
Dashboard Example
Think about your situation

Can you detect anomalies in near real-time?
Can quickly leverage your departmental data?
Is your diagnostic data accessible, organized, & current?

Can you envision, design, roll-out and update business processes quickly?
Can you orchestrate processes across multiple systems?
Can you do all this without custom code and dependence on vendors?
Scenarios at Huntsville
Huntsville Utilities Realized Scenarios

- Reverse Rotation
- Transformer Utilization
- Connectivity Model Issue
- Voltage Out of Range
Reverse Rotation

Problem

• Identifying & resolving reverse energy flow with different meter forms and programs across multiple departments

Challenges

• Difficult to identify the important instances of the event
• Difficult to document resolution steps
• Difficult to track and be cognizant of repeat offenders

Direct Benefits

• We were able to identify and resolve certain reverse rotation events that were generated due to bottom fed meter bases. Resolving these allows us to focus on actual reverse rotation events.
Reverse Rotation

Reverse Rotation (K base)

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<th>Event Type</th>
<th>Meter</th>
<th>Meter Form</th>
<th>Meter Status</th>
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Workflow Definition

Workflow for when Reverse Rotation is detected on a 2k & 16x14/4s meter format:

- Check PrePaid Open Tickets and Stop Photos
- Undetermined Lead Orientation
- Check Meter Shop Work Order - Reverse Pan
- Issue Work Order
- Undetermined Lead Orientation
- Check Meter Shop Work Order - Track Meter
- Issue Work Order
- Undetermined Lead Orientation
- Check Meter Shop Work Order - Condenser
Transformer Utilization

Problem

• We had no visibility into the health and utilization of our distribution transformers.
• With Trynzic we were able to combine our GIS connectivity model with our AMI data to sum up children meter interval data to calculate transformer utilization.

Challenges

• Dialing in the appropriate parameters to detect over/under utilization on transformers. – Season, Power Rating, KW thresholds, etc.

Direct Benefits

• Monitor all distribution transformers based purely on data already available.
• Detect/alert proper teams when AMI usage data + GIS model indicates overloaded transformers to proactively address
• This ability combined with known customers to have electric vehicles (EV) can be powerful
Connectivity Model Issues

**Problem**

Many meters are connected to the incorrect transformer in the GIS data base. This needs to be resolved for our new OMS, Mapping, and Trynzic event definitions to work correctly.

**Challenges**

It is hard to identify the issues, and more difficult to catch the errors as they happen.

**Direct Benefits**

- Quickly identify issues with the transformer and meter relationship in the connectivity model.
- Allows for quicker discovery and resolution to minimize bad data for other systems it rely on the data.
Connectivity Model Issues

The transformer is in blue and the meter is in green and white. This meter is five spans away from the transformer it is paired with in the GIS database.
Voltage out of Range

Problem
Our AMI headend has little visibility into voltage measurements in a meaningful way. Voltage values are individually based per meter with no tie to what transformer or circuit feeds the meter. This can overwhelm operators and can be labor intensive to drill into each event to determine the proper voltage. Configuring tiered voltage ranged events is impractical in our AMI headend.

Challenges
• Data is spread across multiple systems – AMI Headend, MDM, GIS, etc.
• Determining the appropriate thresholds of voltage out of range boundaries
• New tools for monitoring the grid creates learning curve and change

Direct Benefits
• Detecting transformer issues with the AMI data already available
• Continuously monitoring/alerting based on near-real time interval meter data
• End-to-end tracking from identification to resolution
Voltage out of Range
Thank you!

Questions?

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