Trynzic

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

Governance
Business case development.

Planning
Technology selection. Scheduling. Program definition. Stakeholder impact assessments. Etc.

Deployment
Meters and related software deployed in the field.

Billing Cutover
Revenue fully driven by monthly usage reads.

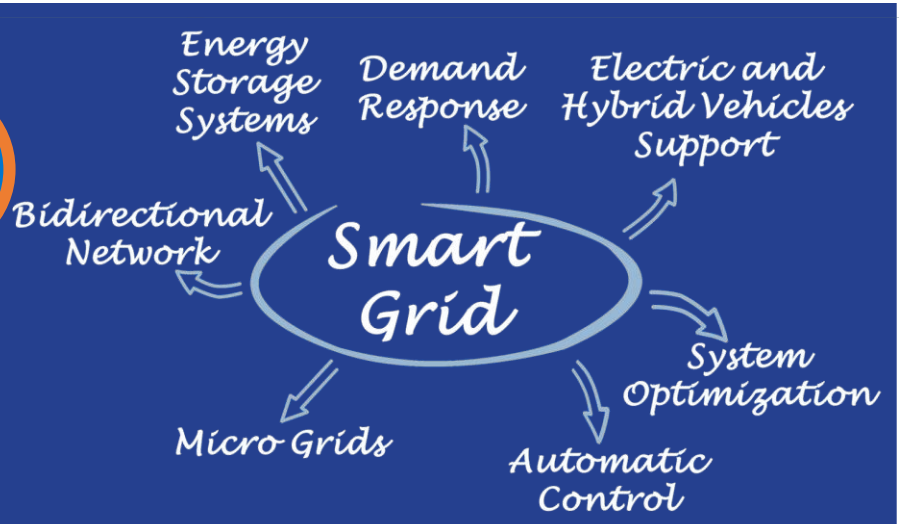
- ❑ Digital Transformation
- ❑ Smart Grid
- ❑ Real-time

Deployment

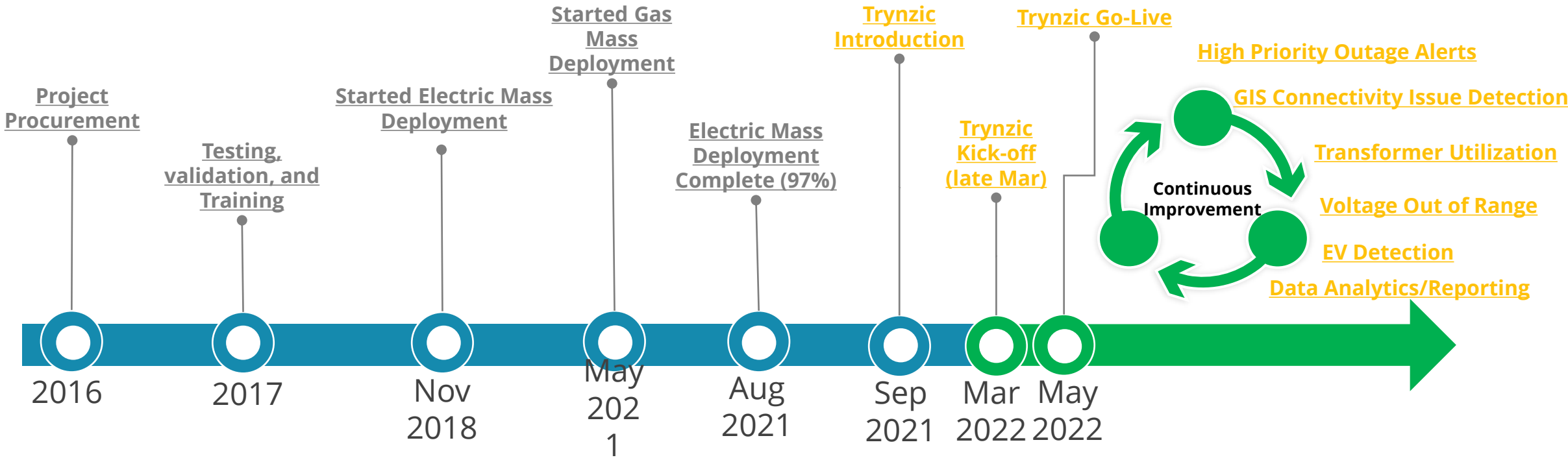
Innovation

- ✓ Meter to Cash:
  - Protect Billing
- ✓ Non-Real-Time Use Cases:
  - Customers can see usage
  - Reports
- ❑ Smart Grid?

FINISH



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

Opportunities

- ❑ 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

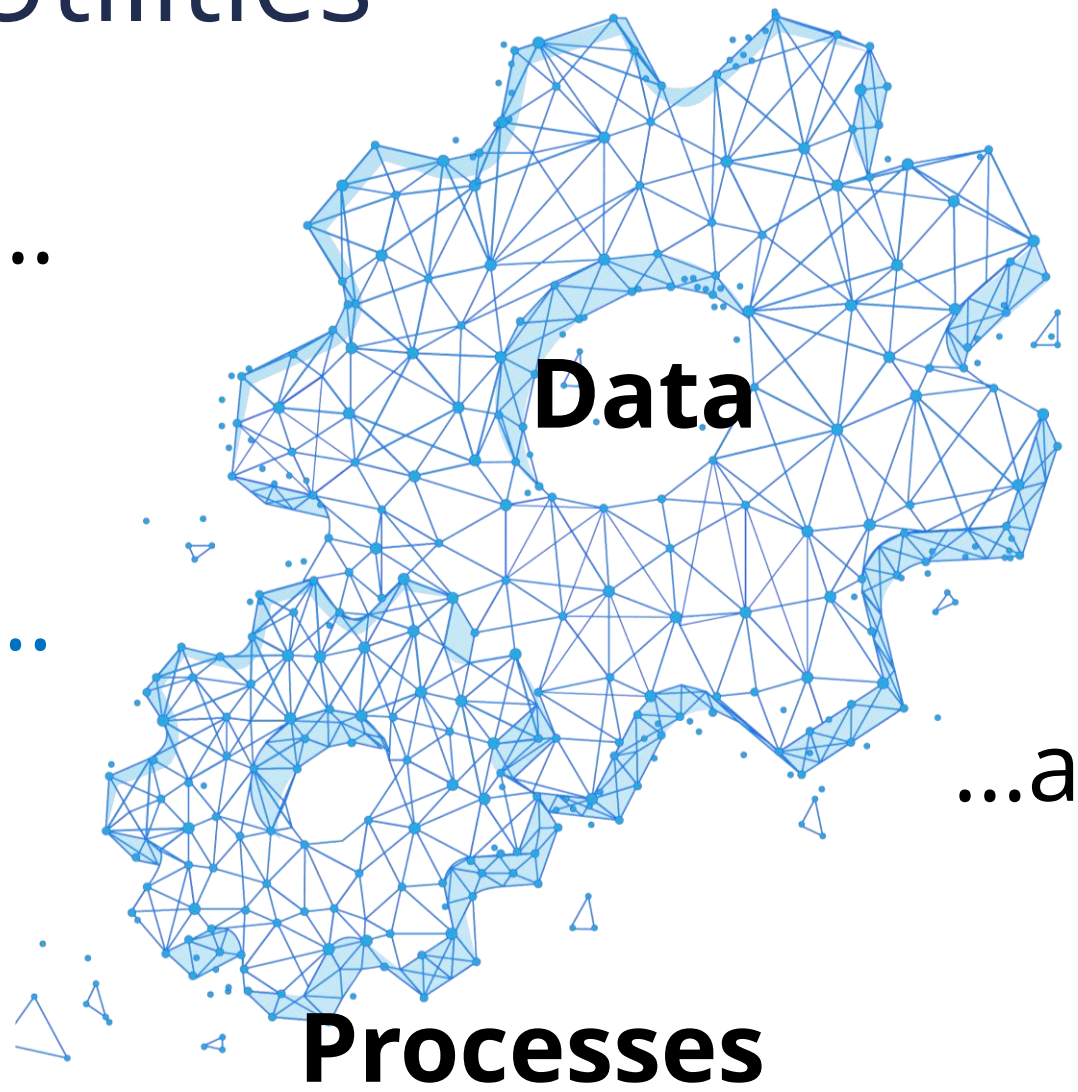
- ❑ Combine pertinent data from different systems into one place
- ❑ Clear the clutter and focus on the important alerts by tailoring alert parameters to utility specific desires
- ❑ Establish dynamic workflows across multiple departments to drive to the end goal without dropping items.
- ❑ Run analytics 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

Smart Trynzic for Utilities

We are the bridge…

… between the smart meter…



…and the smart grid

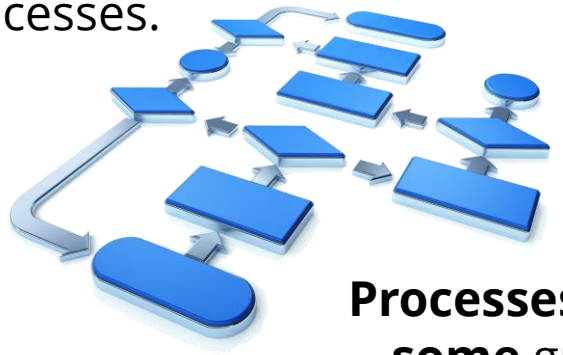
Current State

Advanced Metering Infrastructure

Traditional Data Analysis Tools

~4 hours on the meter

Utilities are businesses with processes.



Periodic report reviews

Processes informed with **some** grid conditions **that previously occurred**.

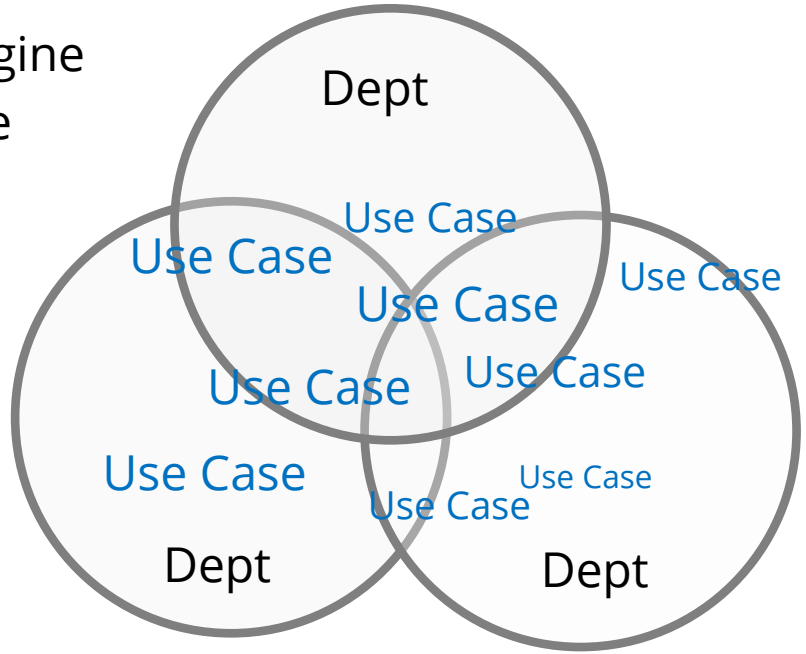
Sit until EOD in the head-end system

Batch data transfers

Path to the Future

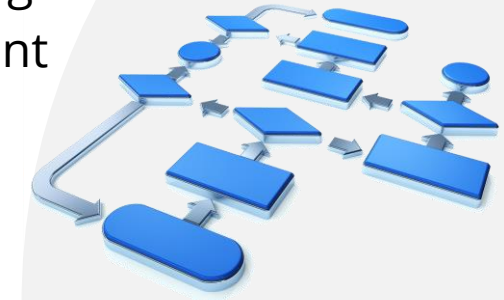
Advanced Metering
- AMI Meters
- Backhaul
- Software (head end, etc.)

- Stream data analytics engine
- Rules engine



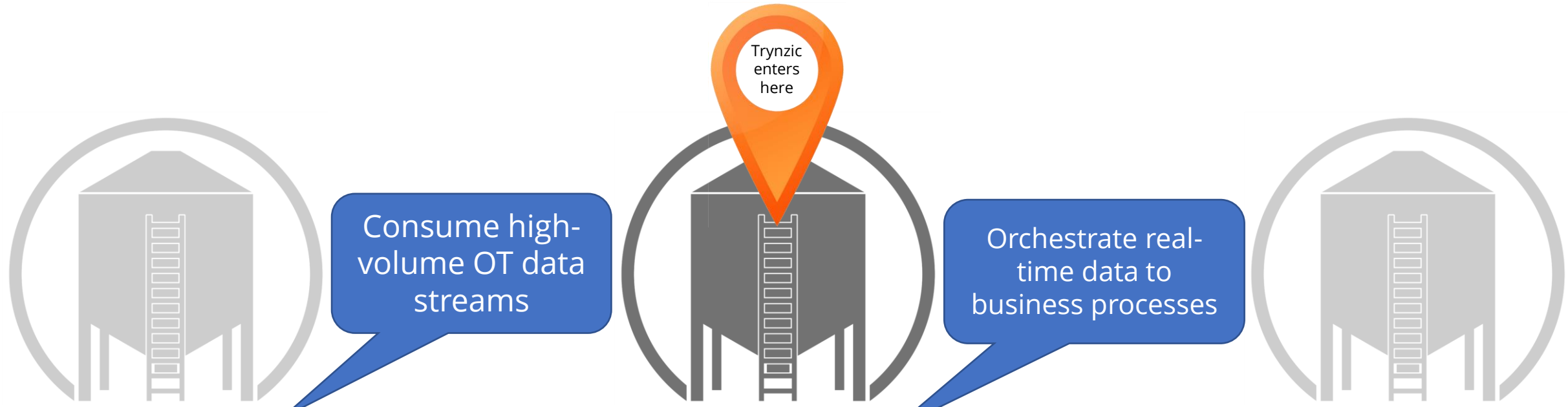
- Integration engine
- Canonical enterprise data model
- Scalability
- Compute & Storage Cost control

- Workflow engine w/ designer
- Orchestration engine
- Case management
- Collaboration



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

System of Systems



Consume high-volume OT data streams

Orchestrate real-time data to business processes

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"

Combine with departmental data

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

Analytics

"looking at history"

Enrich your analytics capability

- Data Lake
- Excel
- Power BI

Huntsville Utilities – Trynzic Implementation

SIMPLE · RAPID · EXTEND VALUE

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

Configure

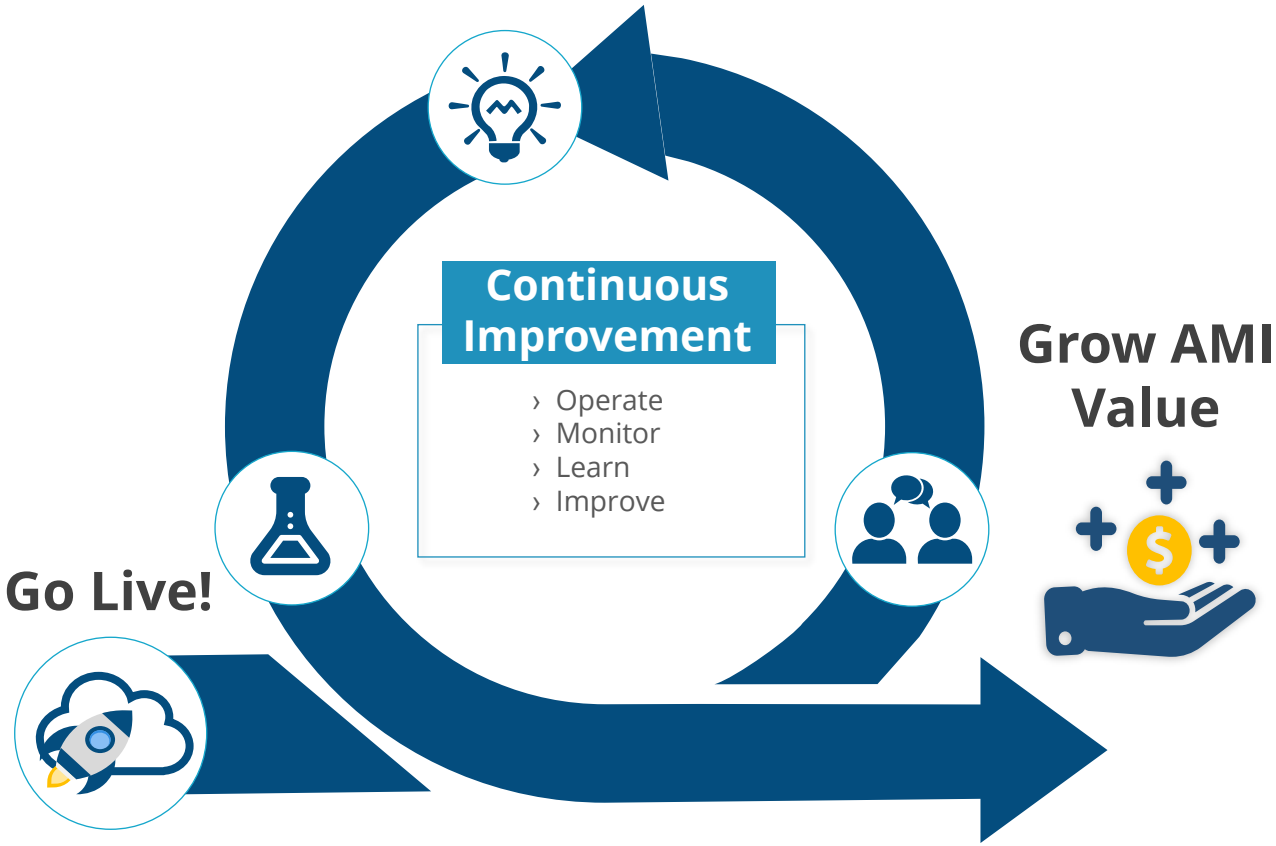
- Leverage industry templates
- Tailor and configure to your needs

Data

- Build data feeds
- Configure security & services

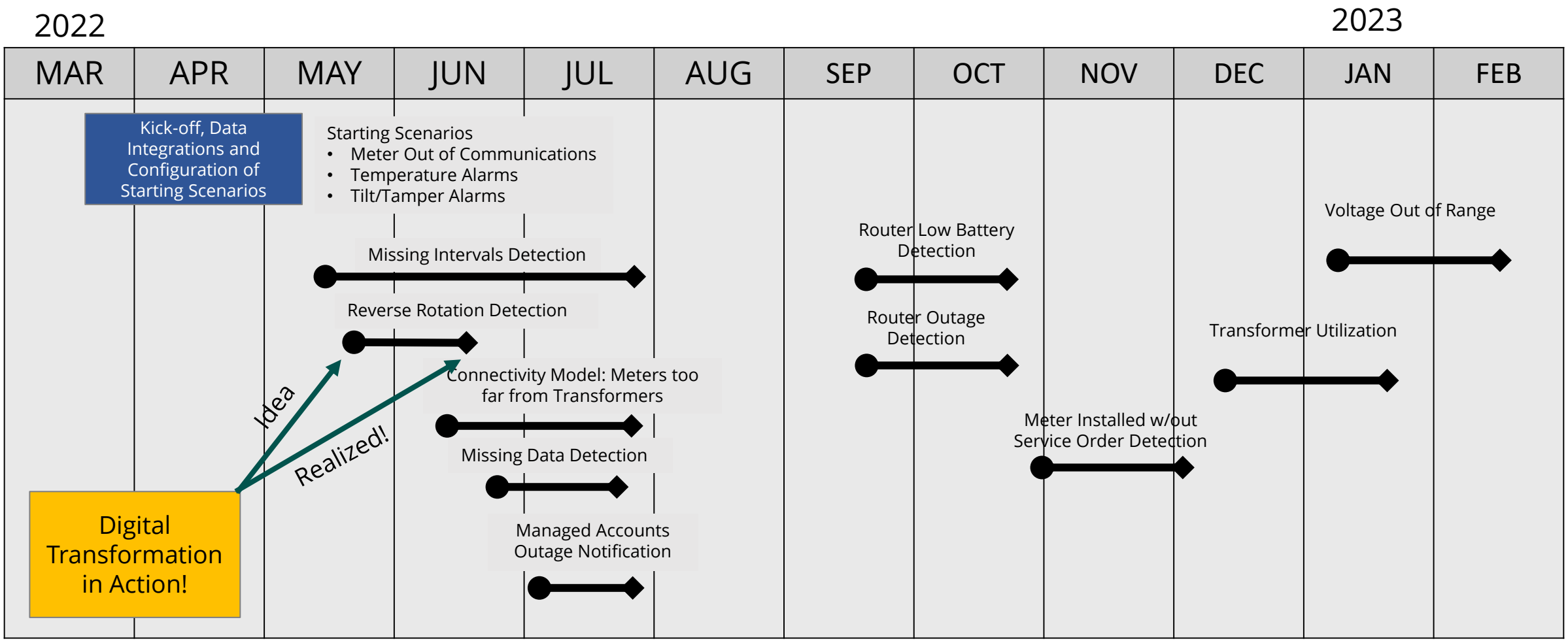
Validate

- Train the team
- Validate data & processes



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



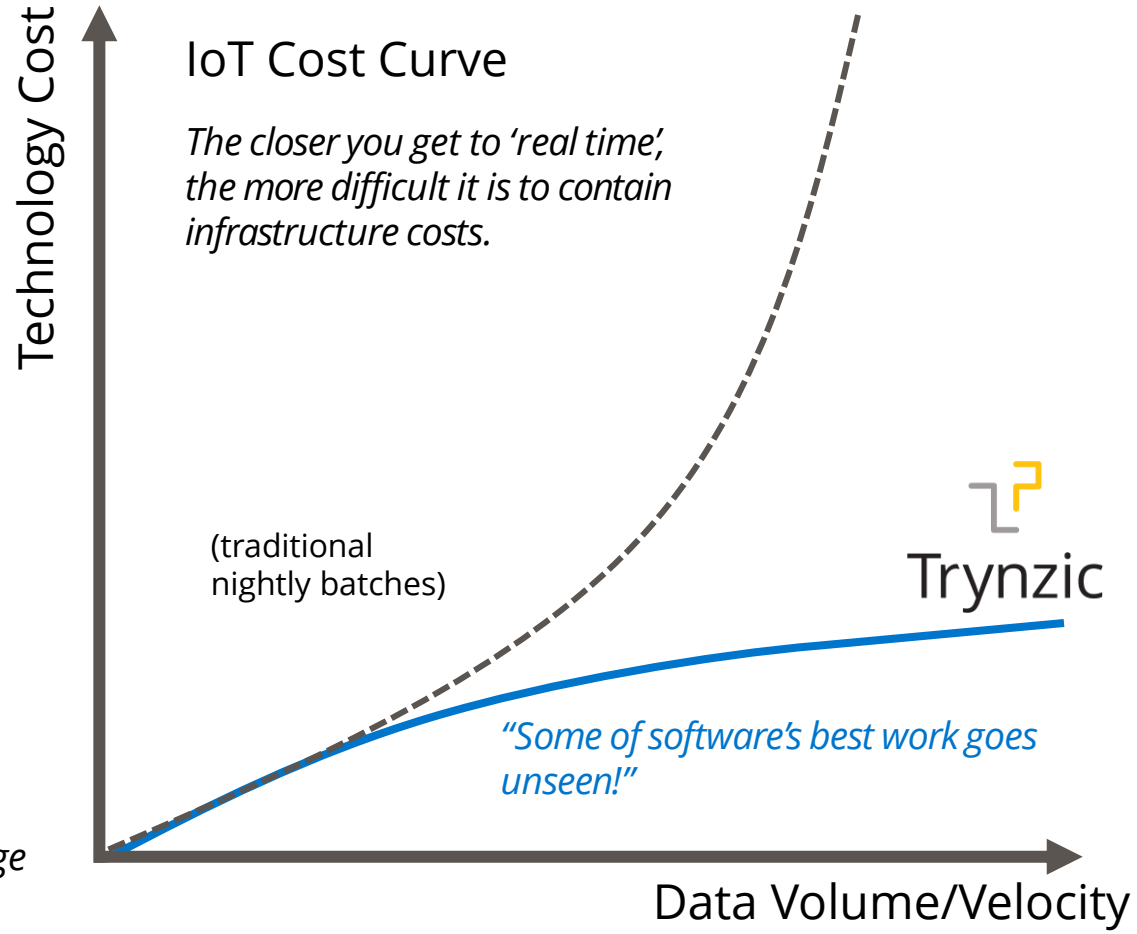
Data Volume Challenges

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*



Trynzic's BI Strategy

Trynzic

Your Azure Subscription

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

Trynzic's Data (Events, Actions & Case)

Ingest

Bring **your data from Trynzic** to an Azure subscription you control

Azure Data Factory

Store

Saved in a **cost effective**, long-term data store

Azure Data Lake

Prep & Stage

Aligned to Trynzic **data standards**

Azure Synapse

Azure SQL

Azure Data Bricks

Self-Service

Made available to **your reporting tools** and existing investment

Power BI

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 it's 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

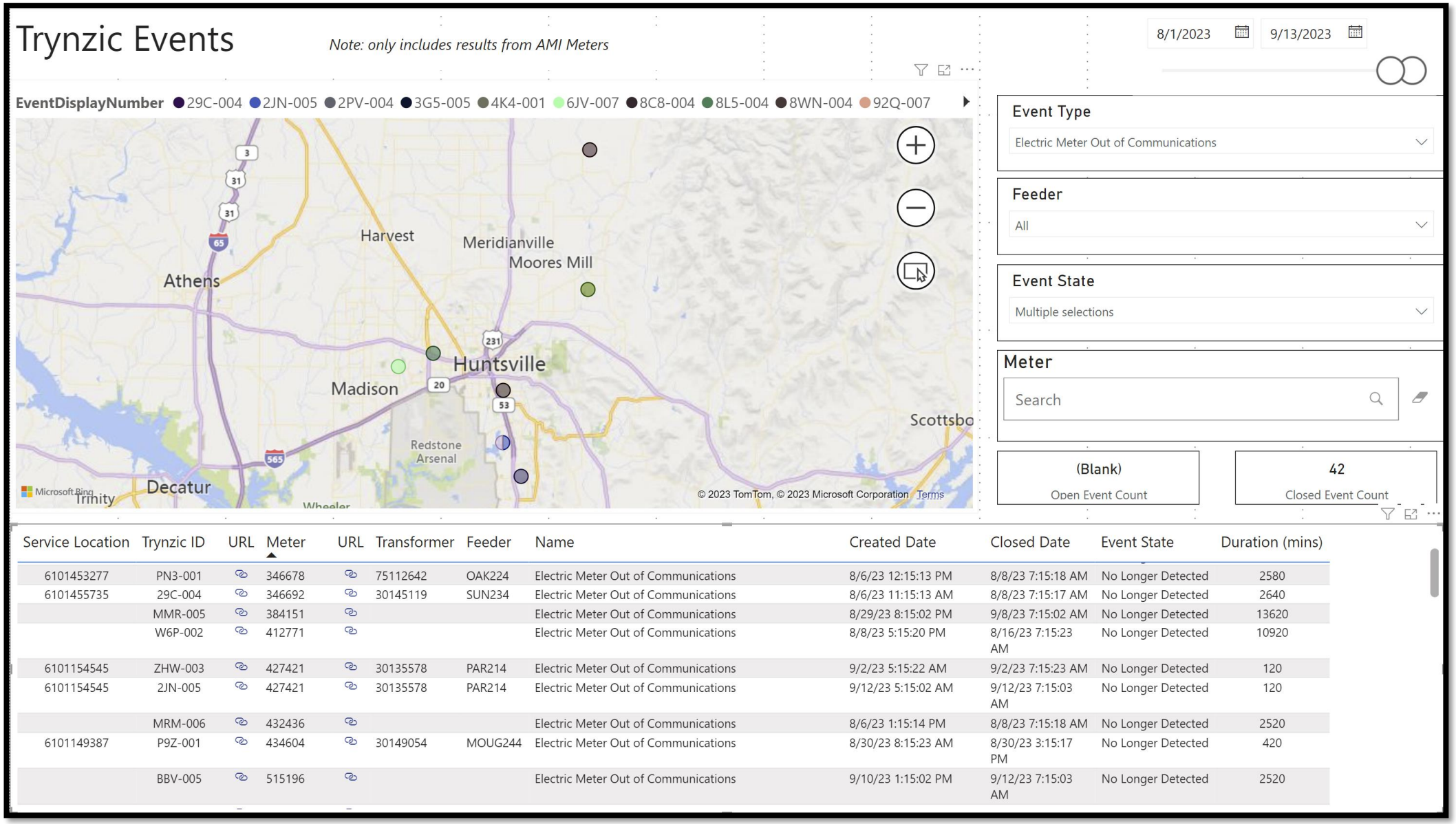
Review & Assess

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



Service Location	Trynzic ID	URL	Meter	URL	Transformer	Feeder	Name	Created Date	Closed Date	Event State	Duration (mins)
6101453277	PN3-001		346678		75112642	OAK224	Electric Meter Out of Communications	8/6/23 12:15:13 PM	8/8/23 7:15:18 AM	No Longer Detected	2580
6101455735	29C-004		346692		30145119	SUN234	Electric Meter Out of Communications	8/6/23 11:15:13 AM	8/8/23 7:15:17 AM	No Longer Detected	2640
	MMR-005		384151				Electric Meter Out of Communications	8/29/23 8:15:02 PM	9/8/23 7:15:02 AM	No Longer Detected	13620
	W6P-002		412771				Electric Meter Out of Communications	8/8/23 5:15:20 PM	8/16/23 7:15:23 AM	No Longer Detected	10920
6101154545	ZHW-003		427421		30135578	PAR214	Electric Meter Out of Communications	9/2/23 5:15:22 AM	9/2/23 7:15:23 AM	No Longer Detected	120
6101154545	2JN-005		427421		30135578	PAR214	Electric Meter Out of Communications	9/12/23 5:15:02 AM	9/12/23 7:15:03 AM	No Longer Detected	120
	MRM-006		432436				Electric Meter Out of Communications	8/6/23 1:15:14 PM	8/8/23 7:15:18 AM	No Longer Detected	2520
6101149387	P9Z-001		434604		30149054	MOUG244	Electric Meter Out of Communications	8/30/23 8:15:23 AM	8/30/23 3:15:17 PM	No Longer Detected	420
	BBV-005		515196				Electric Meter Out of Communications	9/10/23 1:15:02 PM	9/12/23 7:15:03 AM	No Longer Detected	2520

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?

Department Applications

AMI Meters

Head End

WOMS

MDM

Data Warehouse

CIS

GIS

• • •

People & Processes

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?

SCADA

ADMS

OMS

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)

SAVE AS

Event ID | Event Type (1): Reverse Rotation (K For... | Created | + Filters | APPLY FILTERS

Event ID	Created	Event Type	Meter	Meter Form	Meter Status	AMI Meter Status
PJ7-000	Wed, May 18, 2022, 1:00 AM	Reverse Rotation (K Forms)	9053077	16k/15k/14k	InService	Normal
6FV-000	Wed, May 18, 2022, 1:00 AM	Reverse Rotation (K Forms)	9031606	16k/15k/14k	InService	Normal
6V8-000	Fri, Oct 14, 2022, 10:30 AM	Reverse Rotation (K Forms)	9051744	16k/15k/14k	InService	Normal
BJ8-000	Fri, Oct 14, 2022, 12:30 PM	Reverse Rotation (K Forms)	319530	2k	InService	Normal
NLP-000	Fri, Oct 14, 2022, 12:30 PM	Reverse Rotation (K Forms)	436025	2k	InService	Normal
9M3-000	Tue, Oct 18, 2022, 3:30 PM	Reverse Rotation (K Forms)	9036759	16k/15k/14k	InService	Normal
GTT-000	Tue, Nov 8, 2022, 8:30 AM	Reverse Rotation (K Forms)	564526	2k	InService	Normal
WJY-002	Tue, Jan 31, 2023, 5:30 AM	Reverse Rotation (K Forms)	9032040	16k/15k/14k	InService	Normal
Z8H-002	Mon, Feb 27, 2023, 8:30 PM	Reverse Rotation (K Forms)	564516	2k	InService	Normal
2JG-002	Wed, Mar 8, 2023, 3:30 PM	Reverse Rotation (K Forms)	374695	2k	InService	Normal

Reverse Rotation (S form)

SAVE AS

Event ID | Event Type (1): Reverse Rotation (S Forms) | Created | + Filters | APPLY FILTERS

Event ID	Created	Event Type	Meter	Meter Form	Meter Status	AMI Meter Status
5LG-000	Sat, May 7, 2022, 7:00 PM	Reverse Rotation (S Forms)	374311	2se	InService	Normal
JRZ-000	Sat, May 7, 2022, 7:00 PM	Reverse Rotation (S Forms)	321400	2s	InService	Normal
92T-000	Sat, May 7, 2022, 7:00 PM	Reverse Rotation (S Forms)	437643	2s	InService	Normal
N7Q-000	Sat, May 7, 2022, 7:00 PM	Reverse Rotation (S Forms)	544233	2s	InService	Normal
L89-000	Sat, May 7, 2022, 7:00 PM	Reverse Rotation (S Forms)	9035334	16s	InService	Normal
224-000	Sat, May 7, 2022, 7:00 PM	Reverse Rotation (S Forms)	324954	2s	InService	Normal

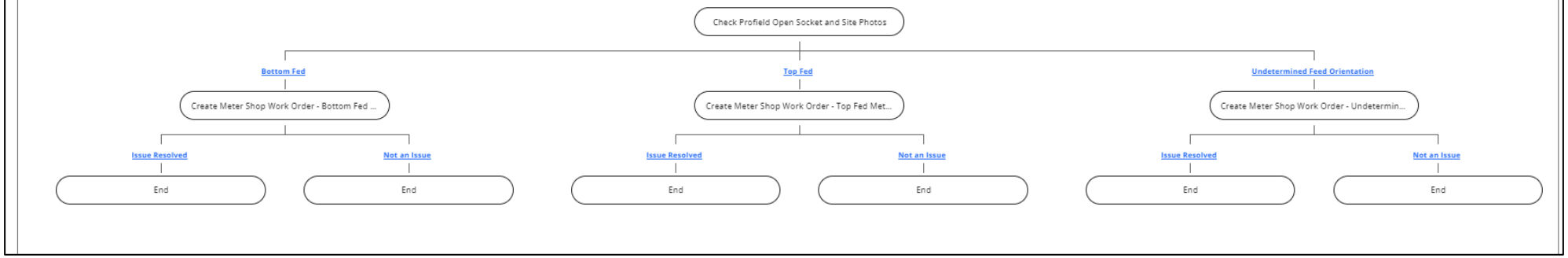
Workflow Definition

SAVE EXIT COPY DELETE ADD IMPLEMENTATION NOTES

Name: Reverse Rotation (K Forms) 26 / 500

Description: Workflow for when Reverse Rotation is detected on a 2k & 14/15/16k meter forms 78 / 500

Show Additional Action and Response Information



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

Transformer Utilization

Ratings

Power Rating
10

Primary Voltage Low
7.2

Primary Voltage High
7.2

Secondary Voltage Low
120

Secondary Voltage High
240

Tertiary Voltage
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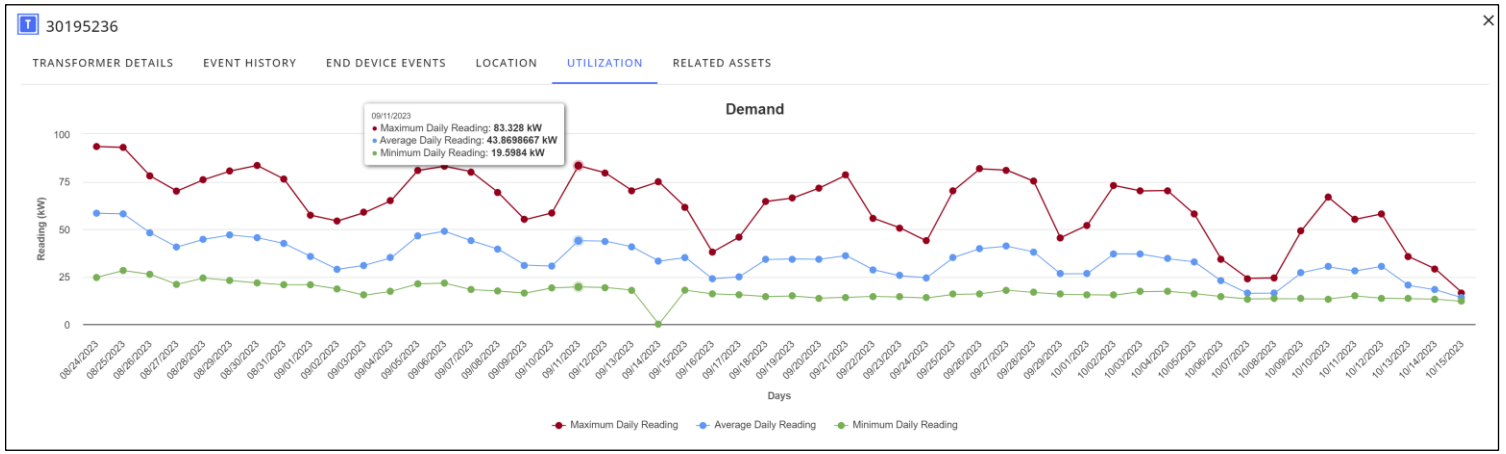
Name

341761

9034519



Ratings

Power Rating
50

Primary Voltage Low
7.2

Primary Voltage High
7.2

Secondary Voltage Low
120

Secondary Voltage High
240

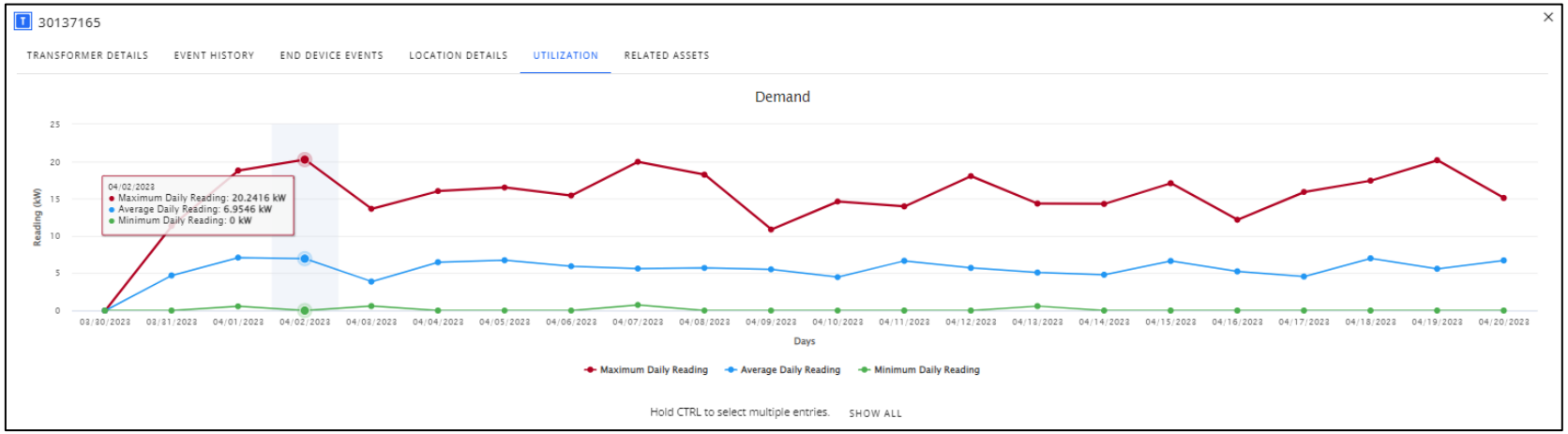
Children

349800

349803

349866

349867



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.

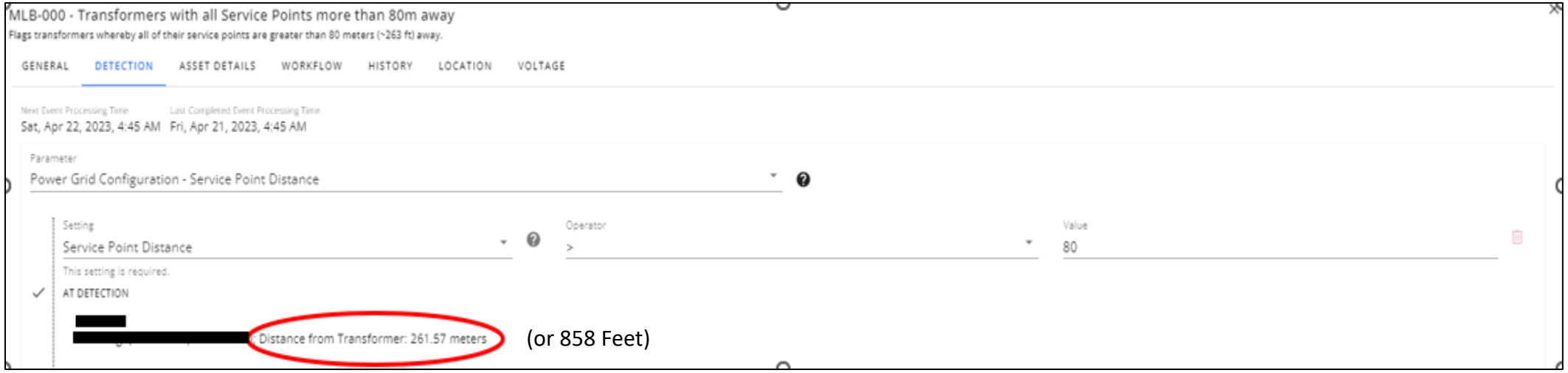
Challenges

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



(or 858 Feet)

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.

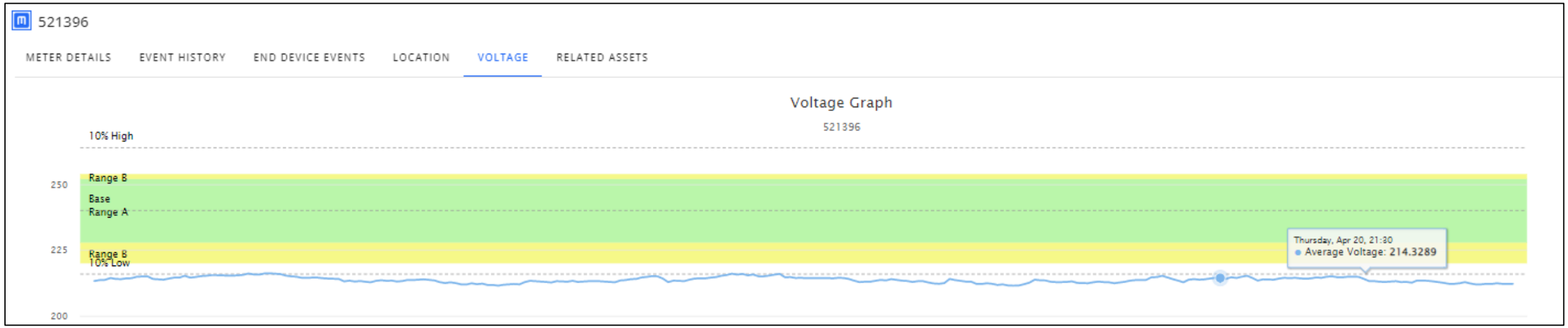
Challenges

- 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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