UAI's 2019
Natural Gas Analytics
Community Report

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Utility Analytics Institute
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Introduction

The Natural Gas Analytics Community was the first Utility Analytics Institute (UAI) analytics community focused uniquely on the application of analytics by natural gas utilities. The group's roster was **107** members strong by the end of 2019, and this is an *excellent* outcome given that several UAI members do not provide natural gas service.

The group's success is due in large measure to the contributions of its leadership team. While UAI strives to limit the time investment of community leaders, it is impossible to overstate the value of their expertise, guidance and enthusiasm.

Community Sponsors[i]:
- Rod Boswell, Office of the CIO - Director Data Analytics, NiSource
- Robert Duvall, SVP, Customer Ops, Safety and Technical Training, Southern Company Gas

Community Leaders[ii]:
- David Baron, Director, Performance Management and Organizational Strategy, SoCalGas
- Eric Frank, Gas Planning Manager, Madison Gas & Electric
- Catherine McCowan, Manager, Risk, Strategy and Planning, Enbridge
- Kydon Witbeck, Manager, Data Analytics, Southern Company

Natural Gas Community Charter & Scope

The Natural Gas Analytics Community began its journey by adopting the following charter statement:

The Community will focus on analytics that will advance the natural gas industry and will provide:
- *An opportunity for members to showcase methods and models that have led to real change in their organizations*
- *An opportunity for members to bring current challenges to the table and get help from a supportive and knowledgeable group of peers.*

An effective analytics practice requires the right skills, data, systems and tools, as well as an organization that is receptive to data-driven decision making. This Community will share presentations and cover topics that will support members in developing all these pillars within their organizations.

A scope statement further articulated the community's desired focus. That scope included:

- People and culture
- Data, systems and tools, and
- Specific areas of interest (process performance, risk analytics, model performance, how to triage large data sets, predictive analytics, key predictors of failure, advanced analytics, etc.)

The community enjoyed presentations and interactive discussions that covered topics consistent with the charter at the 2019 monthly meetings (highlights to follow). Current UAI members that wish to access past meeting recordings and presentations of this community may do so by submitting a Request to Join for the **Natural Gas Analytics Community**.

If your organization is not yet a UAI member and would benefit from being a part of this type of collaborative community, contact UAI today to learn more about UAI membership!

Predictive Analytics in Damage Prediction (March 2019)

We learned that a natural gas distribution company in the Midwest is using a customized machine learning model to assign a probabilistic risk ranking to individual locate requests. The goal is to find an objective way to analyze and shrink the population of locates with a damage to a manageable level. A pilot of the model reduced approximately one-third of all damages to one-tenth of the ticket population, supporting implementation of effective solutions. There are plans to use the model to identify those types of damages that increase the risk of a safety incident or are likely to impact a more sizable population.

An interactive discussion between members followed the presentation on how to predict the likelihood of a cross bore on a sewer main or lateral. We heard different ideas on how to address the issue.

Gas Distribution System Reliability, a Customer Perspective (April 2019)

We heard about the Value-Based Asset Management Model employed by a Canada-based energy transportation and distribution company. The model seeks to balance cost, performance and risk, and it enables the utility to prove that its assets are safe, reliable and profitable.

This Canadian utility also uses network reliability modeling to better understand network outages, enhance safety and improve reliability.

The goal is to:
- Isolate and mitigate unplanned outage risks
- Identify capital programs to support planned and reduce unplanned outages
- Support the creation of a distribution system reliability metric from the customer's perspective

Data modeling considerations and challenges, the toolset used, and initial results achieved were described. This utility plans to use the insights gained to improve operations (e.g., compare planned vs. unplanned outage cost, support root cause analysis, identify process improvements) and the customer experience (e.g., develop solutions for areas with higher outage rates).

The People Side of Data Sciences: It's More than an Algorithm (June 2019)

The presenter's organization's – an investor-owned utility in the state of California – Performance Management and Organizational Team act as internal consultants in the areas of data science, workforce capacity planning, enterprise change management and continuous improvement. The presentation included a few real-life examples, a description of the federated organizational model utilized and the key motivations driving data science.

We learned how this utility's Human Resources Organization supports data science. That support includes forums, communities, social media, embedding analytics skills across functions, learning opportunities, flexible work schedules and progressive benefit plans. A proactive effort is in place to attract and *retain* data science professionals. The interview process is robust. Project diversity, a strong analytics community-of-practice, a safe environment (no fear of failure) and professional development options help drive retention.

This utility also operates a lab to pilot analytic ideas, find successes and failures fast, accelerate analytics time-to-market and advance an intelligent enterprise through a business and analytics mindset. The goal is to enable data-driven decision making and bring about positive strategic, tactical and operational change. We learned about two success stories and future initiatives on the utility's roadmap, including big data automation, predictive maintenance, customer engagement, dynamic IVR, autonomous vehicles and augmented reality/virtual reality.

Introducing Analytics in a Smaller LDC – (August 2019)

We learned about a Midwest-based natural gas and electric company's five-year digital transformation project, which includes the migration from legacy systems to Oracle Utilities, implementation of AMI meters and creation of a corporate data governance council. The goal is to transform the utility into a digital, integrated enterprise. Components of that vision include becoming an employer of choice, delivering 360-degree view of the customer, flexibility, new products and services, optimized costs and automation. A comprehensive five-year program timeline was shared.

According to the presenters, for analytics to flourish, one needs a strategy, a solid technology foundation, expertise, organizational adoption, the ability to put insight into action and a data governance process. This utility's strategy is to engage stakeholders, nurture an appreciation of

analytics, achieve transformation one step at a time to gain trust, analyze transformation efforts and remain patient.

Typical data governance challenges were described:
- Inconsistent data definitions, security and protection
- "Data wrangling" by business users, leading to inconsistent analyses
- Lack of clear data roles, and
- Data that is either inaccessible or not available

We heard about the data governance maturity model and SWOT analysis used to assess the current situation. A new data governance operating model to be enabled by the plan was also shared.

From this natural gas and electric company's perspective, the primary goal of analytics is to support good business decisions. Technology should make data interactions easier, support automation and ensure controllable, consistent information. While analytics investment is at an all-time high, user adoption lags. Expertise is needed to determine what data is important and how to use it. We learned about the organizational adoption maturity model adopted by the utility and quick-win use cases used to demonstrate the potential of analytics.

Building an AMI Analytics Roadmap for Natural Gas Utilities (September 2019)

Our presenters, representing a natural gas and electric utility, explained that most of the company's service area has had AMR in place for years. One the company's operating natural gas distribution utilities began deploying AMI in 2018. Seventy-seven percent of the AMI business case was based on eliminating manual meter reads; other benefits cited related to utility operations, customer support and societal factors. We learned that every meter will receive an AMI module. In the short run, meter data management functions will be supported by the current CIS, daily reads will be the norm and hourly reads will have limited use outside of industrial/commercial customers. The goal is to complete deployment (other than hard-to-access meters) by September 2020. Future value is anticipated from pressure monitoring, cathodic protection, etc. The Energy Efficiency and Marketing groups have also identified future data projects worthy of consideration.

We saw a visual depiction of the phased approach used. The idea is to start with small, well-defined data; future phases create an analytics roadmap as data volume, variety and complexity increase. Use cases are categorized as publishing, descriptive, diagnostic, or predictive. Today, use cases fall into the publishing and descriptive categories. A detailed timeline of use cases was provided, with diagnostic applications appearing in 2020 and predictive initiatives arriving in 2021.

The natural gas distribution company in the Midwest shared these learnings:
- Achieving data quality during AMI deployment is hard
- Introducing new data sources (e.g., alarms/alerts) requires a measured approach
- Monthly/bimonthly-read CIS business rules were built to trust system vs. the read – need to "flip" the culture,
- Expose processes and people to AMI reads as soon as possible
- Avoid complex estimation routines – get the read, don't bill, or use CIS estimations
- While CCF data precision is acceptable, the goal is to reduce to CF

Unbilled Revenue Estimation and Use of AMI Data for Benchmarking Estimation Accuracy (September 2019)

This Midwest-based utility defines "unbilled" as the amount of natural gas that a customer has used but not billed in a calendar (revenue) month. The utility's objective is to standardize and automate the process, better understand results and improve accuracy by using the most-effective predictive model. Challenges include multiple end users and opinions, different analytical dialects and an inability to observe what the utility desires to predict (i.e., unbilled periods).

To address and overcome data limitations, the utility plans to:
- Break down the billed usage data to the premises level and to each premises bill segment
- Compare multiple models and use AMI to examine error (e.g. OLS regression with HDDs and CDDs vs. more complex methods)
- Model rates instead of quantity to support scalability and normalize for length of bill
- Benchmark against reality where possible and used AMI at premises to measure accuracy

The utility's application aims to provide unparalleled information about utility operations and detailed visualizations to support business decisions. The standardized, reproducible, accurate, consistent and fully automated process is the goal.

UAI

AI: 'Is it Real or Just a Dream'? (November 2019)

We learned that the presenter's organization's – an investor-owned utility in the state of California – is beginning conversations on how to use artificial intelligence (AI). For purposes of the meeting, AI was defined as a machine or algorithm that can learn and implement actions.

This utility is using natural language processing in the regulatory arena as a research tool to drive consistency across regulatory filings by the presenting utility and other utilities, to ensure a consistent tone across witnesses, to find errors and to identify confidential information.

An interactive discussion followed with one utility member sharing that they have implemented a chatbot and others describing future AI applications, including the use of machine learning to support forecasting, to predict locate tickets and to support leak detection. UAI Staff described AI applications shared at Utility Analytics Week 2019.

AI-related responses from the UAI Natural Gas Community Survey were also reviewed. The results showed that natural language processing and data discovery top the list of AI applications. Respondents indicated that the key factor limiting AI adoption is the lack of clear ROI and a business case. There was a tie for second place, with an equal number of respondents identifying skills gaps, lack of technology/tools and lack of executive buy-in as the next major obstacle. Several respondents mentioned data-related issues.

The meeting concluded with a brief overview of the survey that addressed a variety of topics beyond AI, including data owners/stewards, AMI, data management, data governance and data traceability.

Safety Management System – SMS (December 2019)

The presenters from one of the largest fully regulated utility companies in the United States, serving natural gas and electric customers, plans to take a more quantitative and predictive approach to identify, isolate and measure safety risk. The utility engaged with individuals both inside and outside of the natural gas industry (e.g., aviation, nuclear energy) to uncover Safety Management System (SMS) best practices. The utility found that significant safety and operational performance improvements are possible. A key takeaway from the presenting utility's assessment was that it is not SMS systems or tools that make the major difference. Instead, creating and enabling the right environment is the most vital component (e.g., a "Plan – Do – Check – Act" approach, a culture of continuous improvement).

There is inherent risk in the natural gas industry. This utility aims to reduce that risk through process safety, with layers of protection, effective and risk-informed asset management and an organizational culture that empowers employees to identify and report risks. The ten essential elements of the SMS approach envisioned were explored. We learned about the vital role of asset knowledge management, including quantitative risk models, asset data enhancements, GIS enhancements and an effective data governance approach. The utility is beginning a process designed to assess risk and develop mitigation programs for each major asset class. The goal is to apply risk-informed prioritization and constraints across asset classes and to develop a risk-informed and executable investment plan for every asset class.

Conclusion

UAI's Natural Gas Analytics Community exchanged ideas, shared experiences and learned from one another in 2019. Due to popular demand, UAI re-launched the Natural Gas Analytics Community in April 2020. If your organization is not yet a UAI member, please **contact UAI today to learn more about UAI membership benefits, including access to UAI's analytics communities!**

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[i] A **Community Sponsor** is a UAI member utility leader who typically holds a director-level position or higher or is a member of UAI's Executive Advisory Council (EAC). Sponsors have expertise and/or a keen interest in the Community's focus area and guide the Community's strategic direction, support the Community Leaders, and provide input on the group's scope, charter, monthly meeting content and deliverable(s).

[ii] A **Community Leader** is a UAI member utility leader who typically holds a manager or analyst position. Leaders have expertise and/or a keen interest in the Community's focus area and provide input on the Community's scope, charter, monthly meeting content and deliverable(s). Community Leaders develop meeting agendas and facilitate assigned meetings with support from UAI Staff.