Using AI to Create Faster, More Accurate Production Forecasts

- **Chesapeake's Haynesville Operations team is piloting artificial intelligence in a machine learning algorithm they built called the General Optimization Analysis Technology (G.O.A.T.).**
- **The G.O.A.T. can build faster, more accurate and more objective production forecasts.**
- **The program started in the Haynesville and has expanded to the Marcellus.**

In 2023, the Haynesville Operations team went to their leadership with both a question and a solution. The question? How can we use machine learning (ML) and artificial intelligence (AI) to create more accurate and faster production forecasts? The team received approval to explore their solution — to create an AI-based program to better inform their production decision-making.

With help from generative AI to write the coding, the team built the General Optimization Analysis Technology (G.O.A.T.) to combine large amounts of data (geologic, completions, production, and other engineering) from specific basins and analyze it — looking for trends and correlations throughout the complex relationships among the data.

The tool helps our reservoir engineers by creating accurate, repeatable forecasts in minutes, a task that would have previously taken engineers and geoscientists months to do. These production forecasts can be used to determine optimum completion designs and well spacing as well as inform the team's understanding of which projects to spend their time on to make the biggest impact.

A consistent approach accounting for spacing, depletion, petrophysical properties, and other key drivers the teams identify helps to draw a conclusion on data that is otherwise inconclusive. This approach also ensures consistency in well-level forecasts.

Roy Sexton, Petroleum Geologist, and David Gurney, Petroleum Reservoir Engineer, created the G.O.A.T. tool at Chesapeake from the ground up in partnership with Kevin Mullins, Software Engineer Specialist, and the IT department. Their ingenuity and drive for continuous improvement and operational excellence is helping Chesapeake continue to lead the industry in efficiency and decision making.

Highlights and successes of the program so far include:

- A dynamic and robust data model that includes dynamically engineered well spacing and depletion information
- Assisted in evaluating the company's merger with Southwestern Energy
- Used in parallel with Modelled Development Value (MDV), Budget, Well Readiness, and Reserves processes to guide engineers

"We are doing something different to make the tool possible, and part of the reason it's working so well is because our team is built on trust and we're able to work well across disciplines," Gurney added.

The team is on a mission to change the way we think about production forecasting and hopes to use the AI to realize additional efficiencies in the future in everything from capital budgets to well scheduling.