# AVEVA

# A model in real time: Building a digital oil field using AVEVA™ PI System™

**Eni - www.eni.com**
**Industry - Oil & gas**

## Goals

- Model and simulate production scenarios

- Deploy a digital twin to maximize upstream assets

## Challenges

- Lack of real-time data prevented robust modeling

- Data collection, extraction, and analysis were time-consuming

## Results

- Increased oil production by 60% in its West Africa region

- Optimized asset parameters and improved production efficiency

## Solutions

- AVEVA PI System

- AVEVA™ PI Vision™

- AVEVA™ PI Server

Headquartered in Rome, Eni S.p.A. identifies and extracts oil and gas across 79 countries. Given the volatility of the oil and gas market, Eni's long-term success hinges on the combination of optimizing a network of upstream assets while locating new extraction opportunities. To do so, Eni engineers use operations data to monitor upstream assets. However, previously, information was not available in real time. Not only did this cause delays in analysis, but it also prevented the team from capitalizing on new revenue streams and ensuring optimized production. To create new efficiencies in production by finding optimal asset parameters, Eni turned to AVEVA PI System. Leveraging data to feed simulation models representing real-time oil field conditions, Eni embarked on a journey to optimize asset configuration and maximize oil production across sites.

## Genetically optimized data

As a first step toward maximizing upstream assets, Eni built a robust integrated production-optimization system. Sitting at the center of this solution is e-rabbit, Eni's proprietary technology. Just as a geneticist can use chromosome markers to predict certain characteristics or desirable traits, e-rabbit applies genetic algorithms to operations data to create various simulation models. Using a series of inputs, such as pump stabilizer speed, pressure, separator, and more, e-rabbit compares every possible combination of settings to find optimal asset parameters.

With e-rabbit, Eni is going beyond traditional targets and moving toward the best possible configuration of assets. However, for Eni to leverage e-rabbit most effectively, it needed access to real-time data.

## The digital oil field

Already an AVEVA PI System user, Eni had access to operations data. However, extracting data from AVEVA PI System caused delays. Engineers manually gathered data in the field, connected it to Microsoft Excel, and imported it into business-software systems before building simulation models run by e-rabbit.

Ready to step into real time, Eni connected AVEVA PI System to headquarters, enabling continuous updating of simulation models. Models are connected to AVEVA PI System and e-rabbit, creating a circular network of integrated and process simulation. "AVEVA PI System can communicate with e-rabbit, and e-rabbit will orchestrate the models that are updated with the real-time data from the field," said Luca Cadei, Deputy Plant Manager, Southern District, Eni.

Beyond e-rabbit, Eni connected AVEVA PI System to eDOF (Eni Digital Oil Field), its internally developed digital oil field solution, for visualizing data coming from AVEVA PI System as well as other data sources. With high-frequency data acquired in real time and mixed with lower-frequency data, such as daily and monthly information, eDOF models and simulates production data. This process gives users across departments the information they need to monitor parameters and understand KPIs. While they can't monitor every KPI at the same time, Eni uses coefficients and pass-through technology to make KPIs a single variable trend, enabling engineers to monitor assets as a whole.
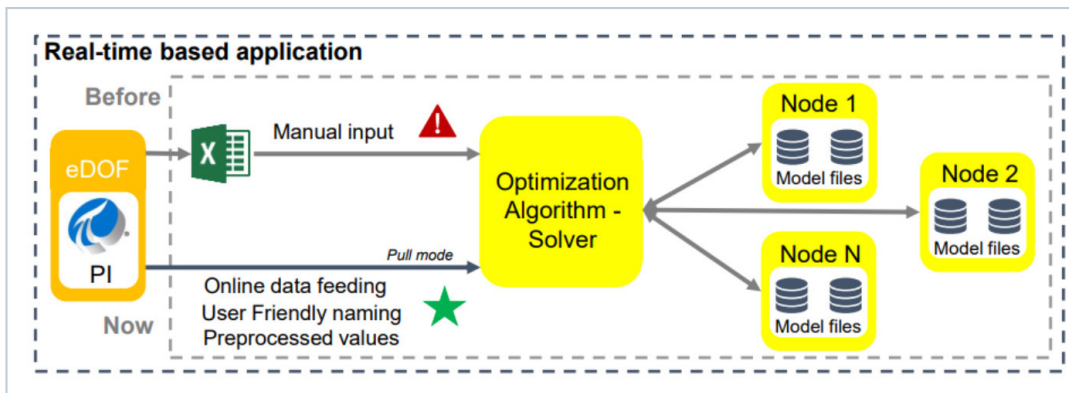
Through the combination of eDOF and AVEVA PI System, key stakeholders have access to remote displays, dashboards, trends, statistics, and more to perform real-time analysis. Data from eDOF is visualized in the monitoring room using AVEVA PI Vision, and real-time data is sent to e-rabbit, allowing engineers to work in a collaborative environment. "If we are not able to visualize what we are building or trending, it's useless," said Cadei. "And AVEVA PI Vision gives us big help for building this type of dashboard."

Using real-time data from AVEVA PI System, Eni simulates production scenarios to find optimal equipment parameters

## Two simulation views

Once AVEVA PI System was connected to eDOF, Eni could implement a true digital twin, with full simulation capabilities viewed two ways. Using the optimization algorithm, users can connect to AVEVA PI System directly, schedule optimization, and receive an output of recommended operating parameters. Those new parameters are then sent to production engineers to implement in the field, often weekly.

In monitoring mode, users can build trends and KPIs by connecting AVEVA PI System with simulation models and defining input variables from the asset framework, an AVEVA PI Server capability. Asset framework elements are organized by country and site and connected to e-rabbit, which runs simulation models showing optimal production. Those models are compared to real-time AVEVA PI System data. Simulations are run throughout the day, enabling engineers to immediately see when assets deviate from projected performance.

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**Luca Cadei**
Deputy Plant Manager, Southern District, Eni

Thanks to these simulation models, Eni has optimized production efforts and even identified new production opportunities. Recently, e-rabbit used AVEVA PI System data to suggest that Eni open a new service line in its West Africa location, increasing oil production by 60%. Not only that, but business units across Eni also now have access to operations data. This access promotes a more collaborative environment and empowers engineers to increase efficiency and production at their sites.

For more information about AVEVA PI System, please **click here.**

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