TIBCO Data Science

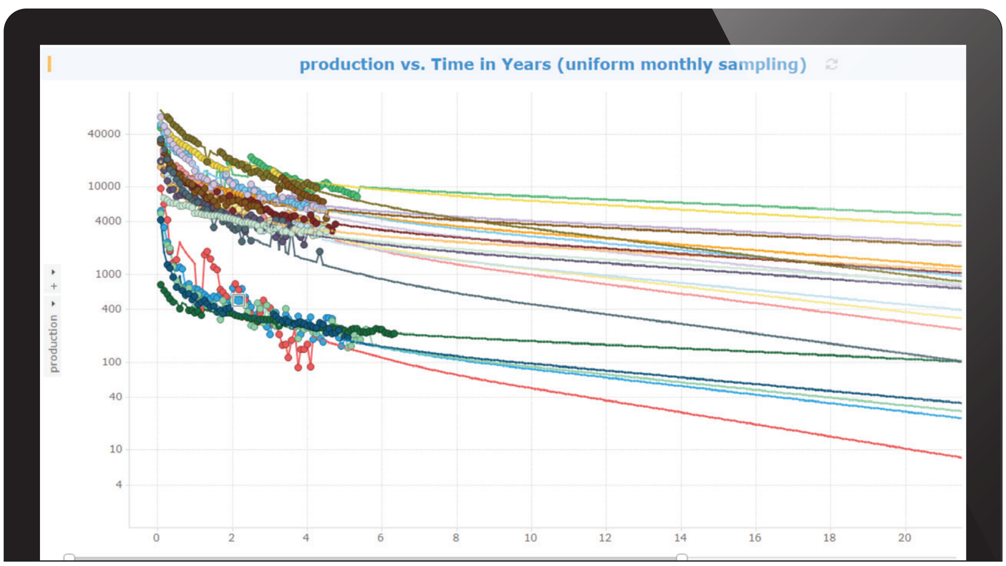
Energy Solutions / TIBCO Spotfire Templates

TIBCO offers many pre-configured TIBCO Spotfire® templates for data analysis in the energy industry. These analyses are configured with controls for data preparation, visualization, and predictive analysis. Each template accepts a primary data table containing raw starting data and optional metadata such as a data dictionary.

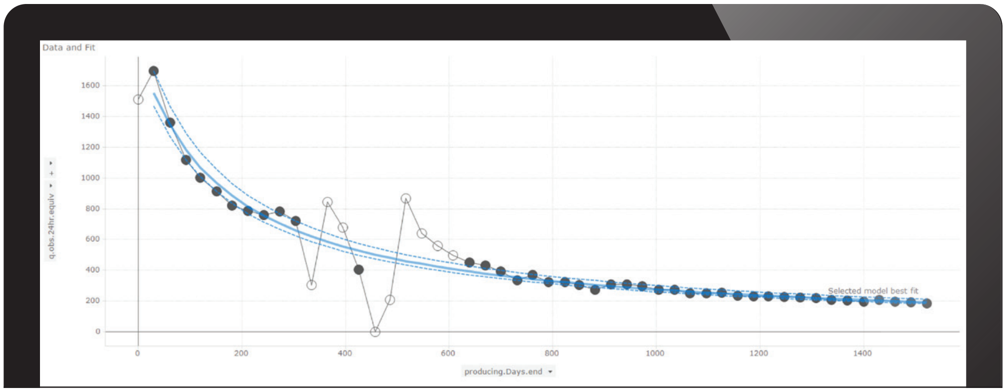
A Spotfire user may replace the starting table with their own data to run the analyses. Templates adapt to columns in the new data. Some coordinate columns may need to be specified, for example, date/time, latitude, and longitude. The analysis then progresses using sensible default settings, which can be tuned by the user.

DECLINE CURVE ANALYSIS

This analysis fits thousands of well production decline curves in minutes. Results include Estimated Ultimate Recovery (EUR) and type curves. Monthly or daily raw production data are input, then in batch mode, outliers are flagged with adaptive processes, and production curves are fit. Users can adjust which data points to include or exclude. Fit choices include hyperbolic, modified hyperbolic, exponential, stretched exponential, power law exponential, and Duong methods.



Outputs include well-by-well fits and interactive visualization and q-D-b diagnostic plots, with EUR specified by time or by a specified abandonment rate. Sensible default settings are used for initial analysis. Users can adjust settings to control outlier detection; minimum, maximum Arps Hyperbolic b value; abandonment rate; modified hyperbolic transition; and other parameters.

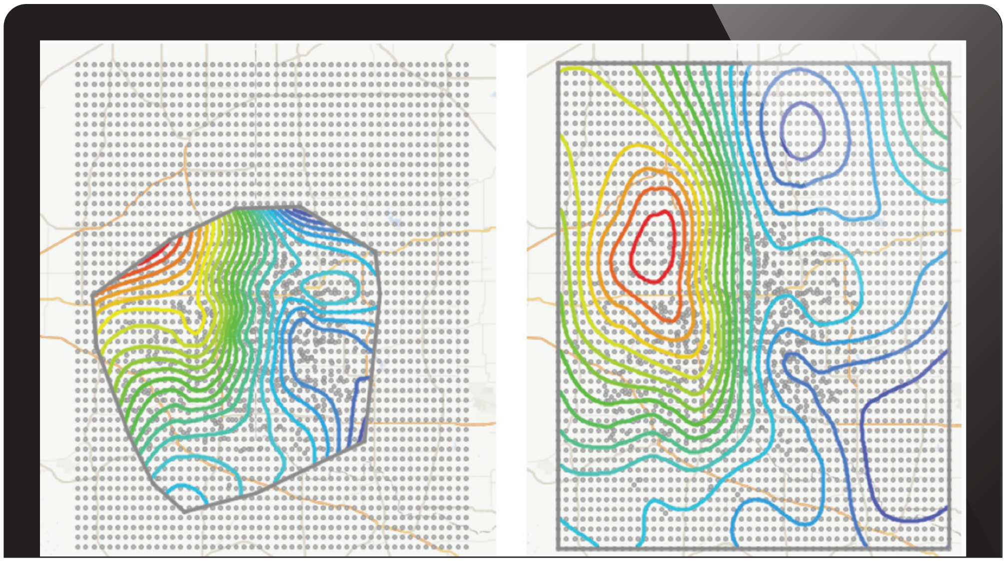


COMPLETIONS OPTIMIZATION WITH MACHINE LEARNING

Analyzes well production (for example, initial production or EUR) as a function of available information such as geology (porosity, permeability, formation thickness, and other attributes) and well completions information (for example, operator, lateral length, amount and types of fluid and proppant) or any relevant measurement or descriptor. It builds a multivariable model using machine-learning methods. It sorts and displays the most significant predictors from the candidate variables. And it displays the model fit to the data, enabling investigation of any unusually high or low production not fully captured by the available predictor variables.

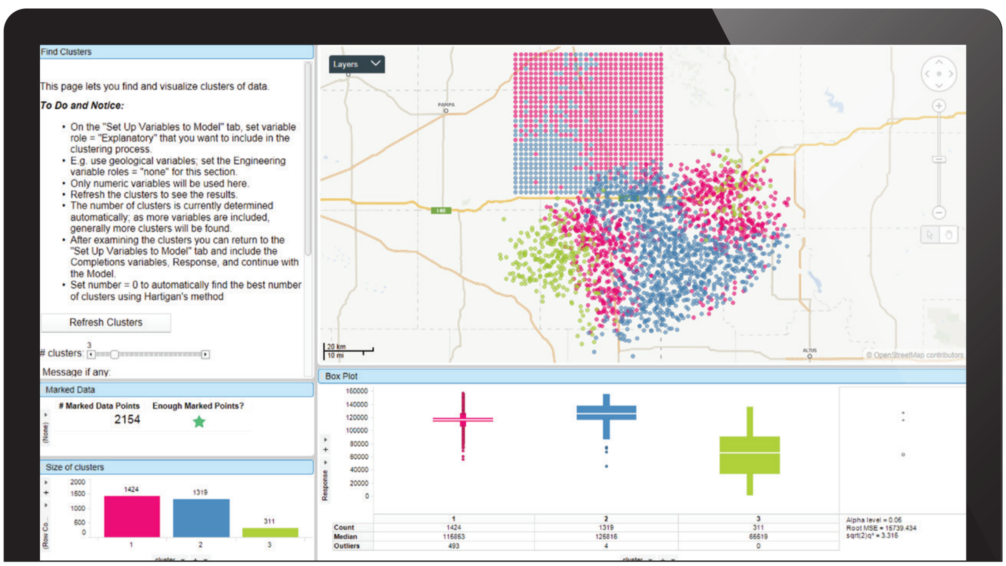
NORMALIZATION AND WHAT-IF SCENARIOS

The model may be used to create on-the-fly predictions for production, holding completions steady across the play. If geology information is available in a new region, the model can provide what-if predictions for production in the new region.



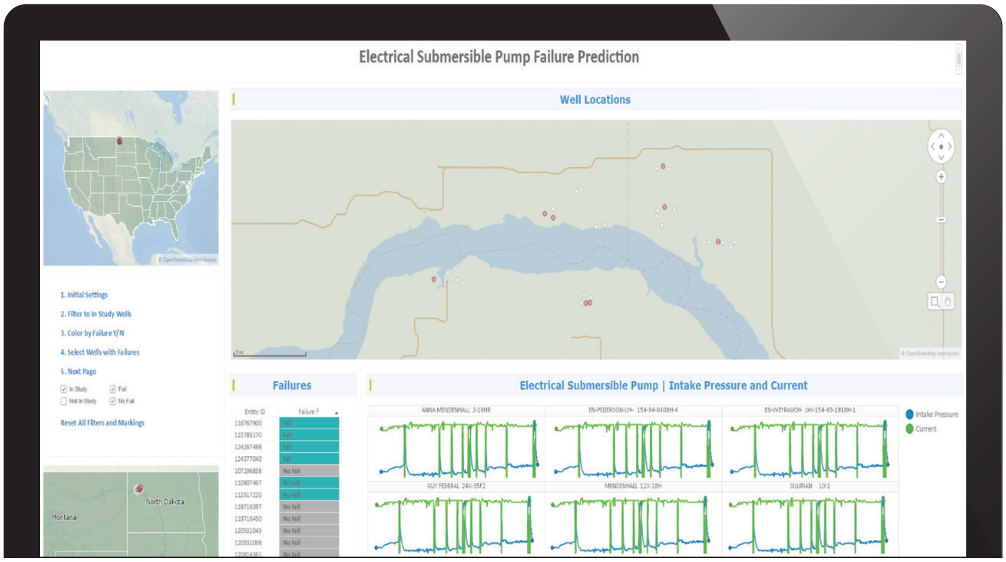
CLUSTERING BASED ON GEOLOGICAL PROPERTIES

Clusters of locations based on geological properties can be found using statistical machine learning methods; this allows developed and undeveloped regions to be analyzed in a unified way, allowing similar regions to be found in the undeveloped regions.



REAL-TIME EQUIPMENT MONITORING

Industrial equipment such as electric submersible pumps in the energy industry is heavily instrumented with sensors to capture important operational performance diagnostics such as motor temperature, intake pressure, and current. Historical sensor data can be analyzed in Spotfire to identify leading indicators and correlations with equipment issues, shutdowns, and failures, and then monitored in real time in TIBCO StreamBase® to detect these conditions as they happen. When these leading indicators are detected, an alerting and equipment management process is triggered.

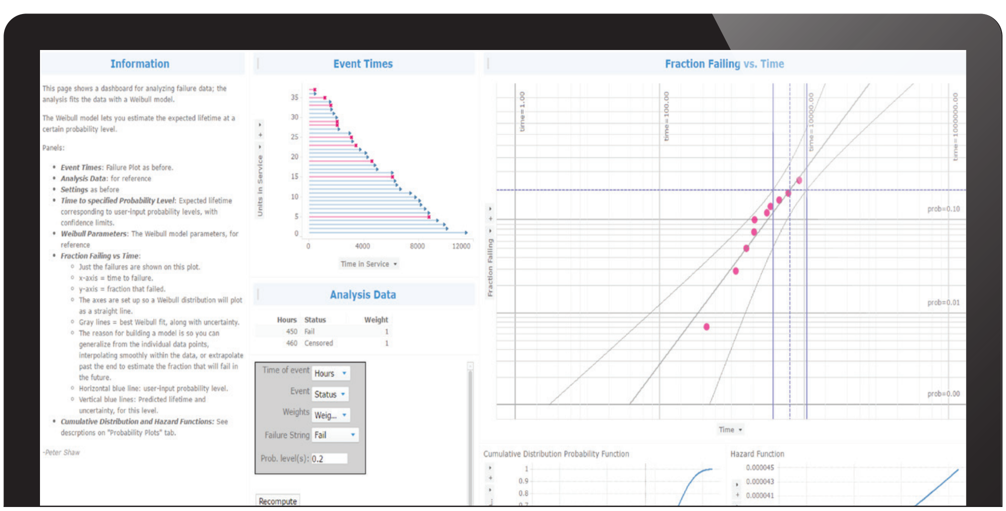


This process can include email notifications, tasks created in business process management and asset management systems, notifications to mobile devices, publishing into databases, and a wide range of other notifications and alerting tasks for human and automated interventions. The published databases may be continuously mined to understand patterns in the notifications. This can identify more subtle patterns in the bad actors, for example, manufacturers with repeated issues and differing operating conditions in different regions. Results from this mining build institutional knowledge and can be fed back in to the leading indicator thresholds for continuous improvement of the system.

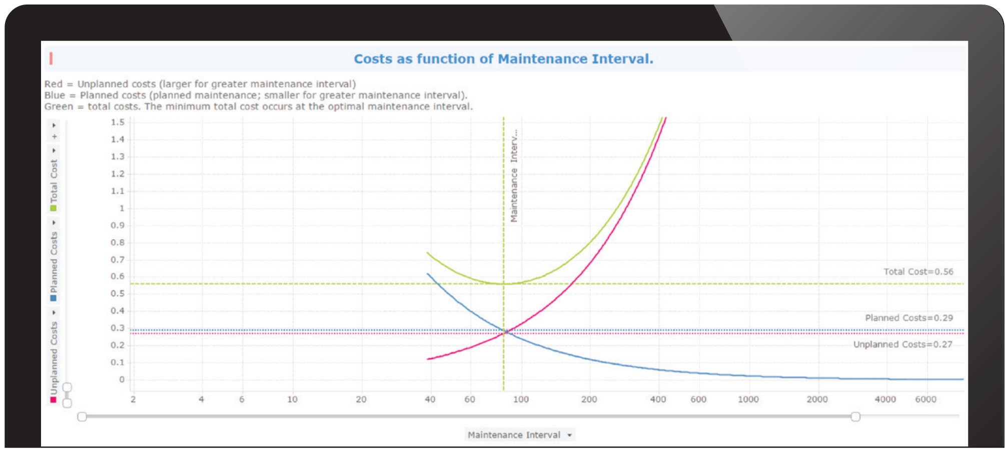
FAILURE ANALYSIS AND PREDICTIVE MAINTENANCE

To keep maintenance costs down, components (for example, pumps, valves, and bearings) operating across multiple locations need to be inspected or replaced on a timetable that avoids catastrophic (expensive) unplanned failure events.

This template analyzes the failure characteristics of components from lifetime data that includes both unplanned failures and planned maintenance, using the Weibull reliability analysis framework. Probability plots enable detection of outliers and multiple failure modes. Hazard plots distinguish between decreasing failure hazard (burn-in or early part failures due to defective manufacturing) and increasing failure hazard (indicating the normal wear-out of parts). These combine to form the typical bathtub shaped failure probability vs. time plot.

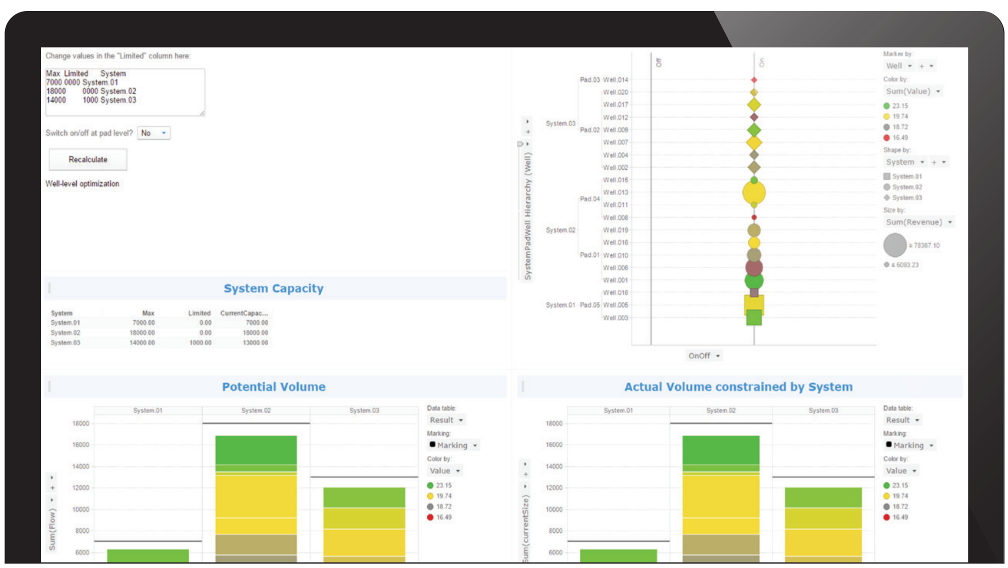


An optimal maintenance schedule is found within this framework by balancing the high costs of unplanned failures against the costs of planned maintenance. Components for which failure is extremely costly receive an aggressive maintenance schedule.



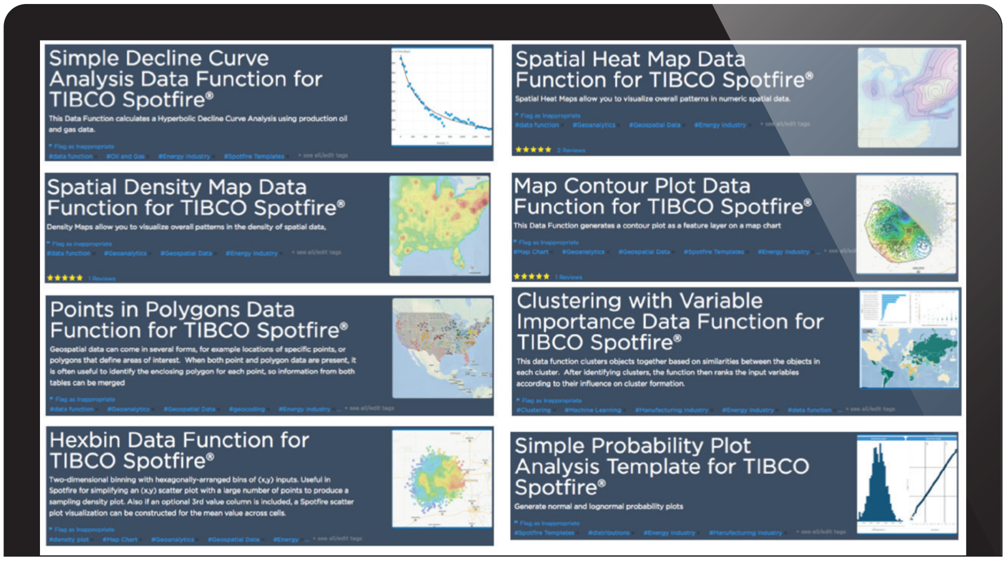
COMPRESSOR GATHERING OPTIMIZATION

Natural gas is compressed at compressor stations prior to entering the pipeline system. Each compression station handles gas produced by a number of different wells. When the production from the wells exceeds the compressor capacity, some wells will need to be taken offline. Because the value per volume is variable across wells owing to variations in NGLs etc., the least valuable wells should be taken offline first to allow the more valuable wells to continue producing. This analysis uses optimization methods to choose the combination of producing wells while meeting the compressor plant limits.



TIBCO COMMUNITY EXCHANGE

The TIBCO Community website (community.tibco.com) is an area containing a question/answer section, a Wiki area for tips and tricks, and an exchange area (community.tibco.com/exchange) where users can download (for free!) example Spotfire dxp files and analyses covering a wide range of topics.



Global Headquarters
3307 Hillview Avenue
Palo Alto, CA 94304
+1 650-846-1000 TEL
+1 800-420-8450
+1 650-846-1005 FAX
www.tibco.com

TIBCO fuels digital business by enabling better decisions and faster, smarter actions through the TIBCO Connected Intelligence Cloud. From APIs and systems to devices and people, we interconnect everything, capture data in real time wherever it is, and augment the intelligence of your business through analytical insights. Thousands of customers around the globe rely on us to build compelling experiences, energize operations, and propel innovation. Learn how TIBCO makes digital smarter at www.tibco.com.

©2017, TIBCO Software Inc. All rights reserved. TIBCO, the TIBCO logo, Spotfire, and StreamBase are trademarks or registered trademarks of TIBCO Software Inc. or its subsidiaries in the United States and/or other countries. All other product and company names and marks in this document are the property of their respective owners and mentioned for identification purposes only.
08/17/17