



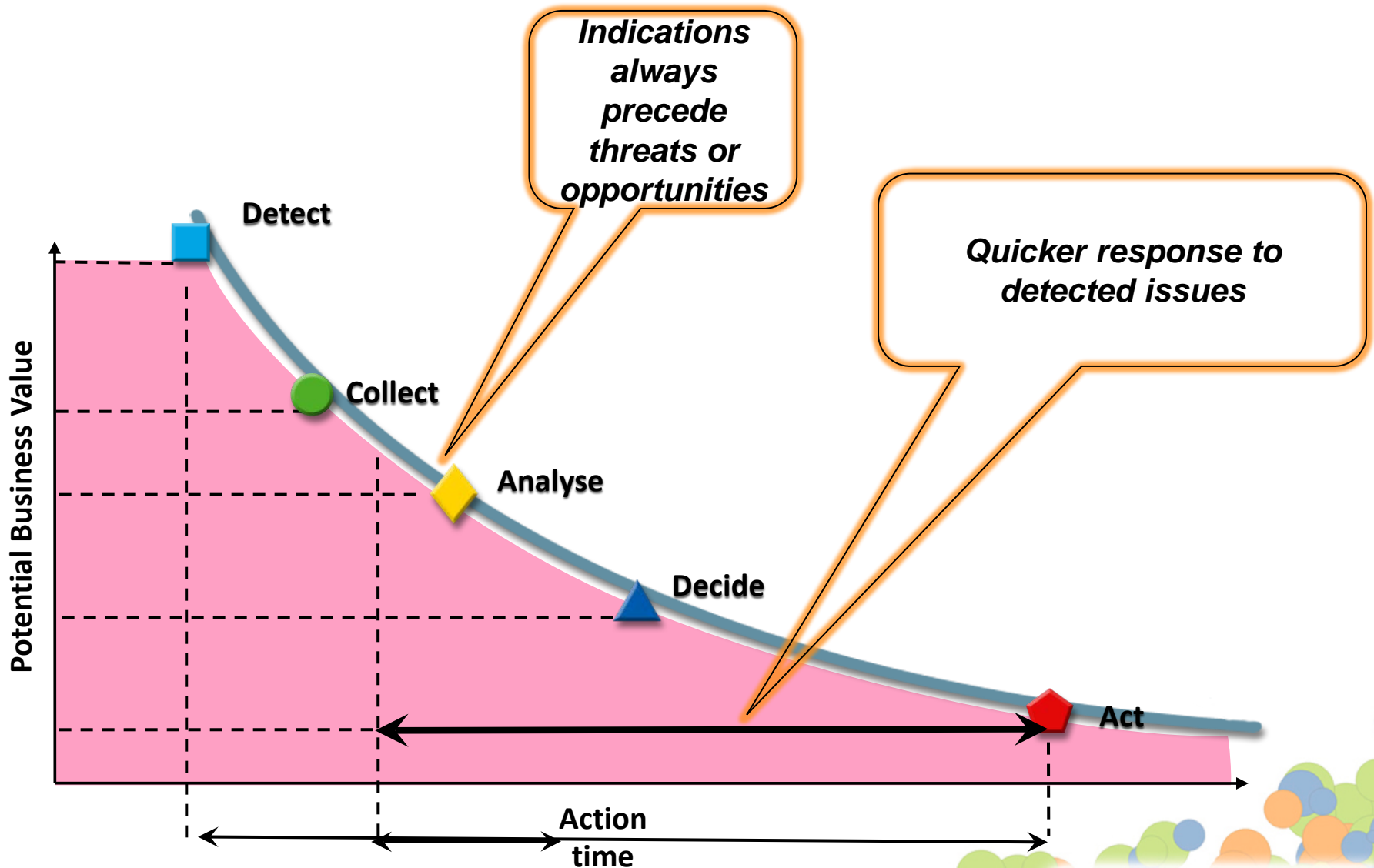
How To Transform the Capital Value of Your (E&P) Information

Visual Dashboards to Predictive Analytics. Easy. Fast. Smart.

Agenda

- Introduction
- Who are TIBCO and our customers?
- Challenge : Data overload and no time
- Status Quo : Vertical applications, spreadsheets, reports ...?
- Solution : Why enterprise data analytics ?
- Success Stories: Here's the evidence
- What could that mean to you ?
- Next steps

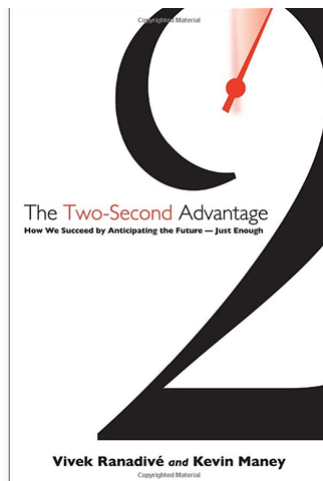
Collapsing Time to Action



The Two-Second Advantage

Pervasive Value of Time.

“A little bit of the right information, just a little bit beforehand – whether it is a couple of seconds, minutes or hours – is more valuable than all of the information in the world six months later... this is the two-second advantage.”

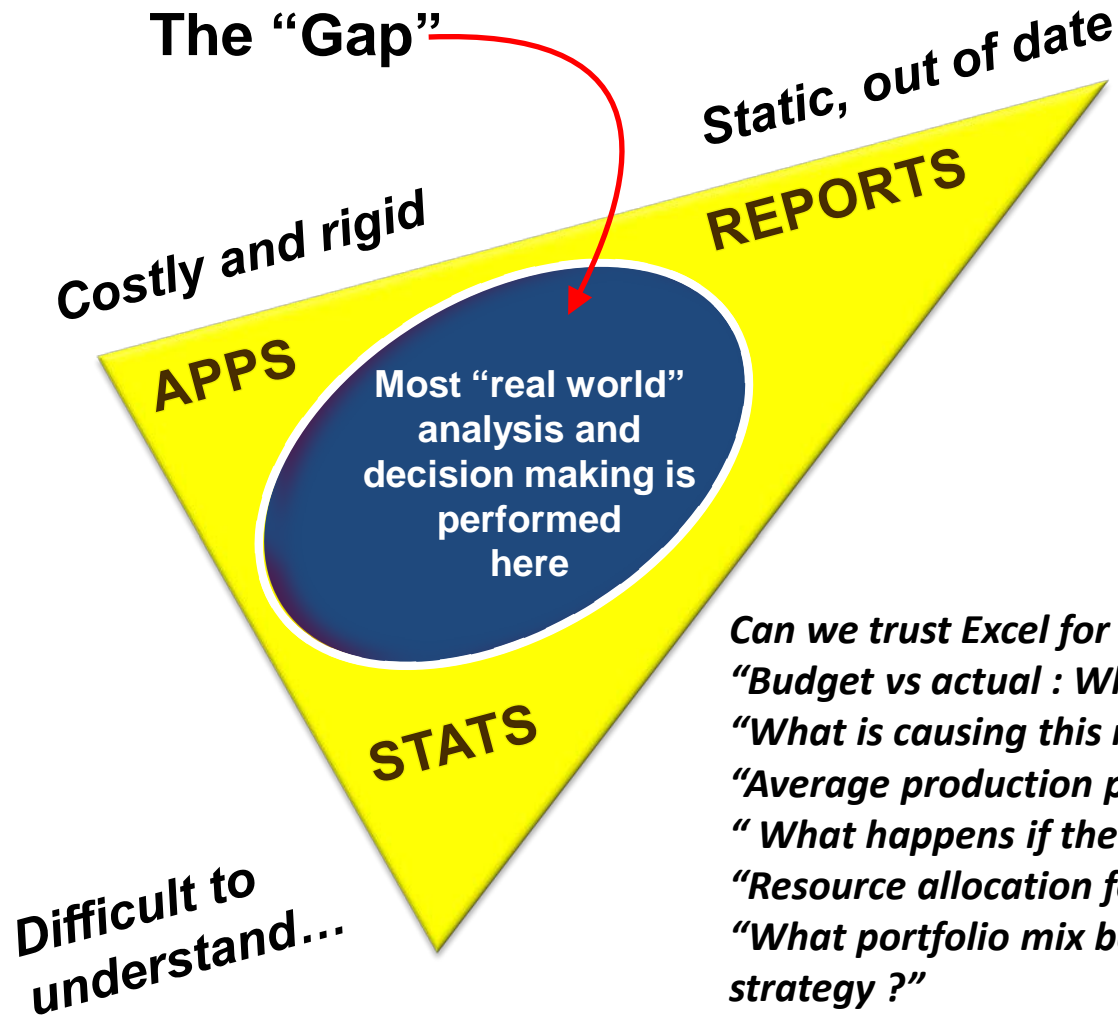


Vivek Ranadivé, Founder, CEO, Chairman TIBCO Software

Who Enjoys This Insight Today ?



The Analytical Gap



Can we trust Excel for :

“Budget vs actual : Why the divergence ?”

“What is causing this non productive time?”

“Average production per field per year ?”

“ What happens if the \$US craters ?”

“Resource allocation for Uganda ?”

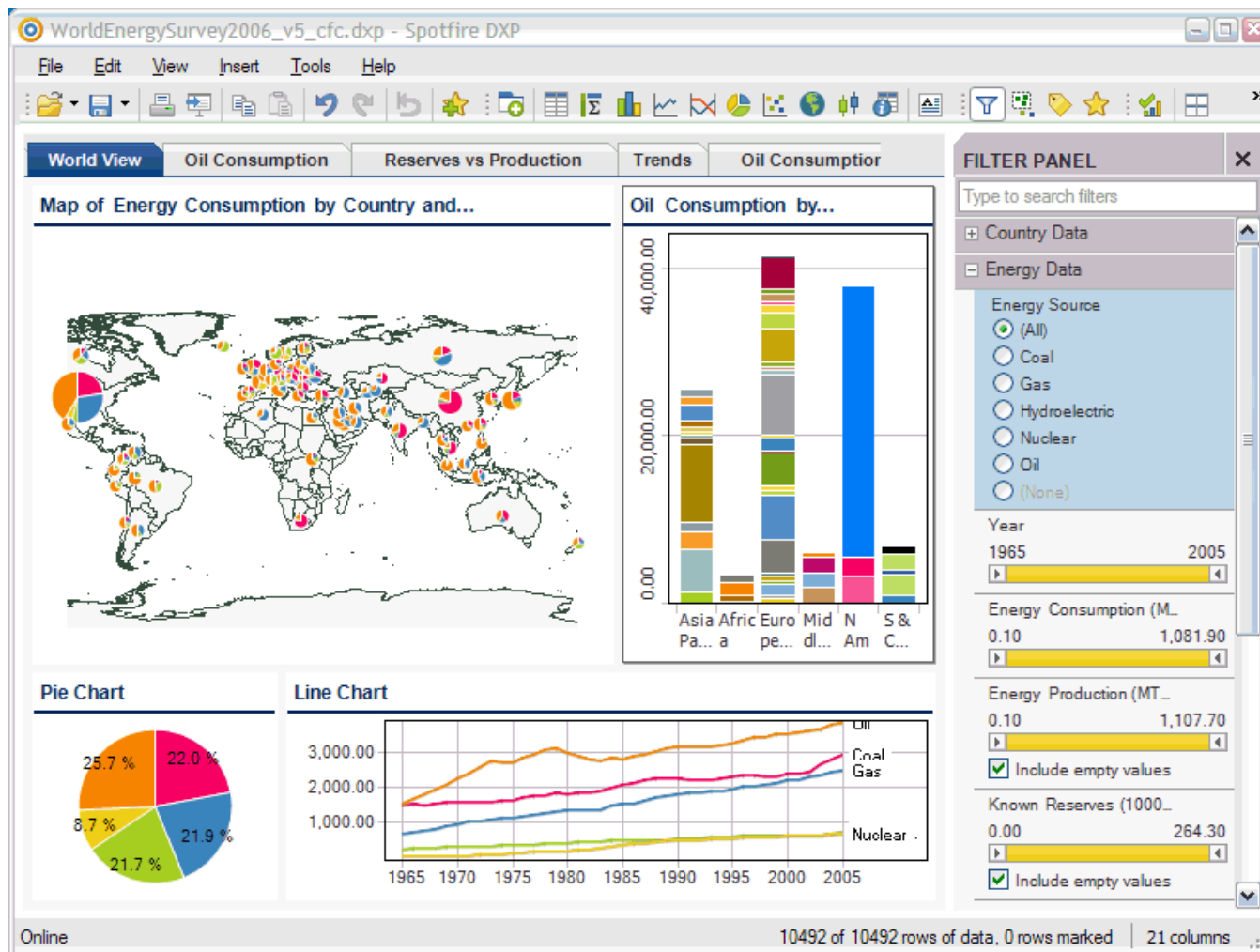
“What portfolio mix best supports our corporate strategy ?”



How many 3's?



Asking Any Question Of Your Data



Start Simple: Classical BI Case

- This questions could be asked:

Production: Can you build a Spotfire project so that I can click on any well on a map and display it's production and the production of the surrounding wells within a certain distance?

Drilling: Where was the most challenging interval in my last drilled side-track?

OPEX: What are my lifting costs, over time, by foreman, by region?

What are my transportation cost?

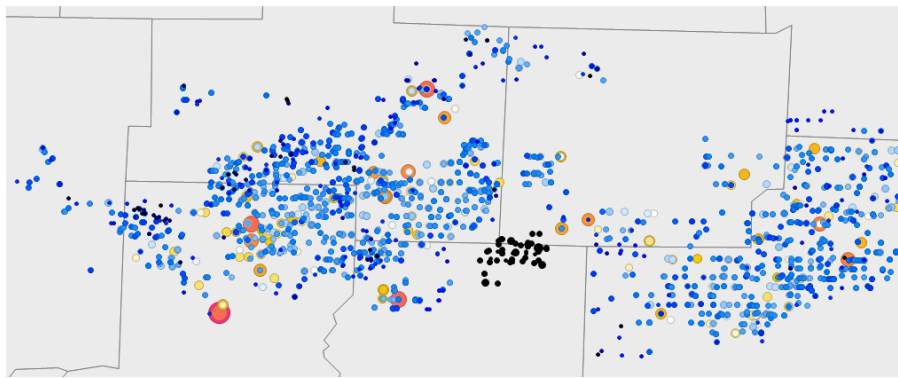
How can we control costs of services? Which is the most efficient services provider

- Answer:

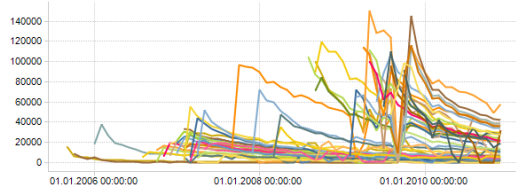
Yes, and you can do a lot more.

Examples: Production

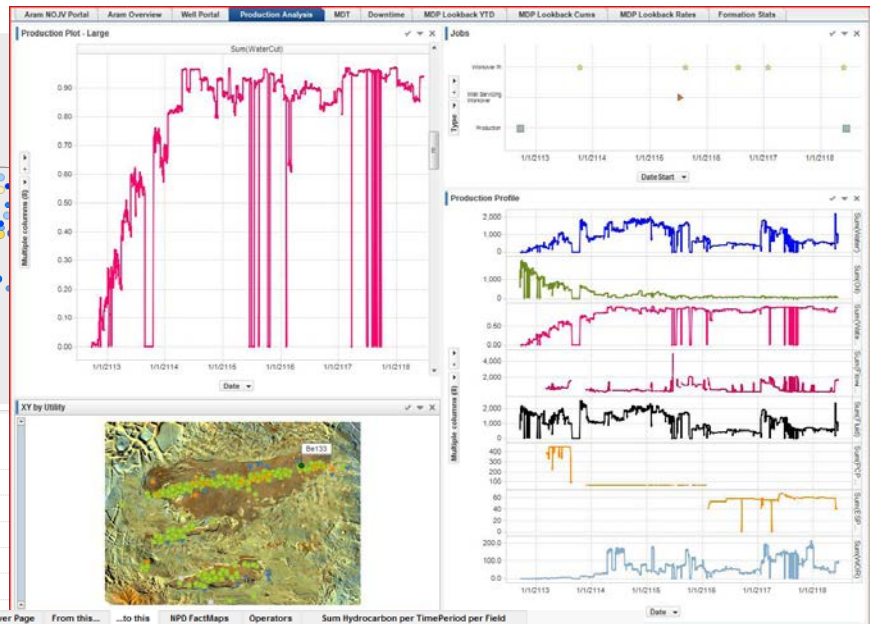
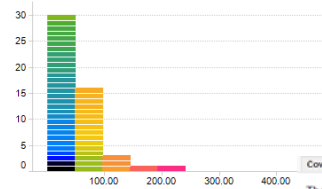
Map View of Wells



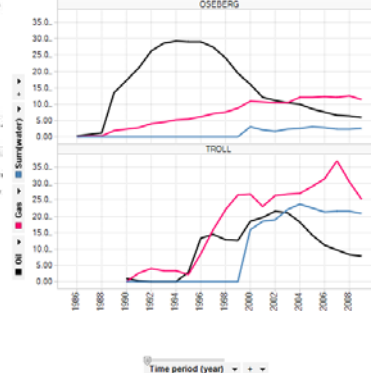
Decline Curves - Chronological



EUR Distribution for selected wells



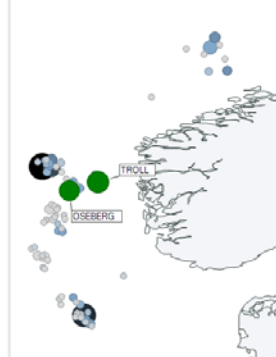
Field production (Oil, Gas, Water)



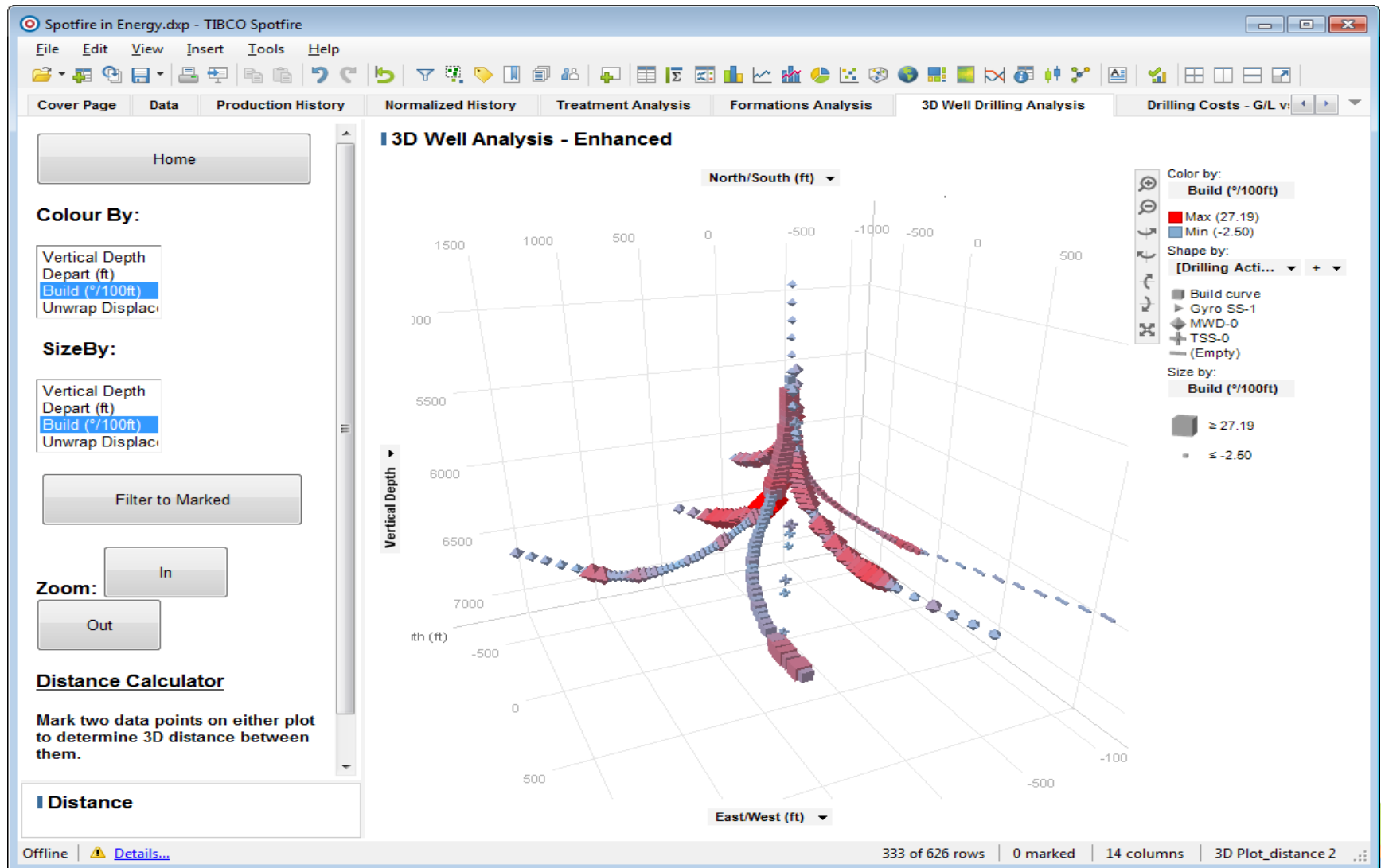
Field Name & Hyperlink to NPD Field Info W

field_name	NPDID_field	h
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OSEBERG	43625	C

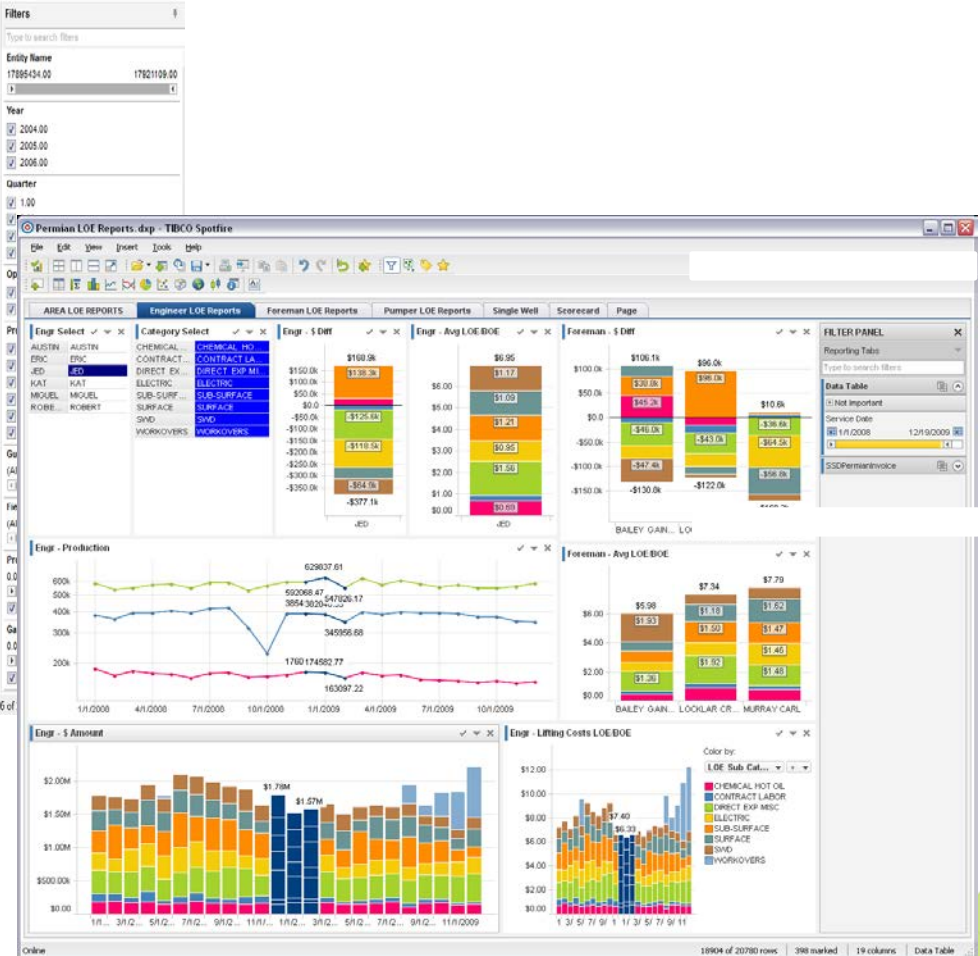
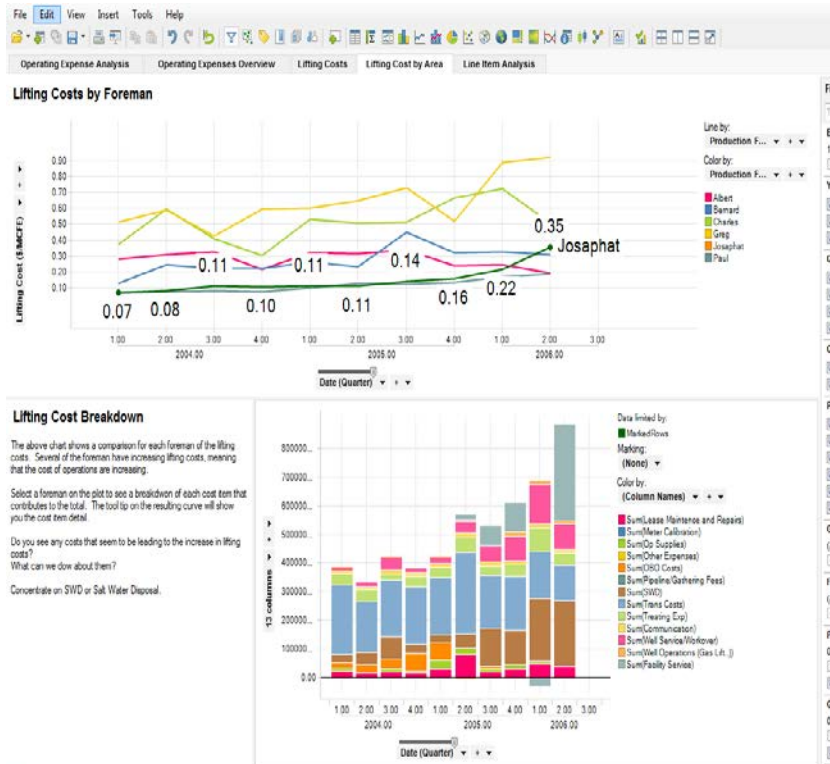
Norwegian oilfields



Example: 3D View of drilling parameter



Examples: OPEX > West Texas Lifting costs



Gain Instant Insight from Disparate Data

Pulling It All Together with Analytics

Single platform for:

- Data Visualization
- Ad Hoc Data Analysis
- Dashboard Publishing
- Predictive Analytics
- Any data
- Desktop, Web, Mobile, and Cloud
- 1-click publishing



Telemarketing Reports
Customer inquiries
Product Downloads
Web Traffic
Customer Sentiment
Ad Spend & Reach
...

Unlock a wealth of hidden insights, trends, and patterns in any data!



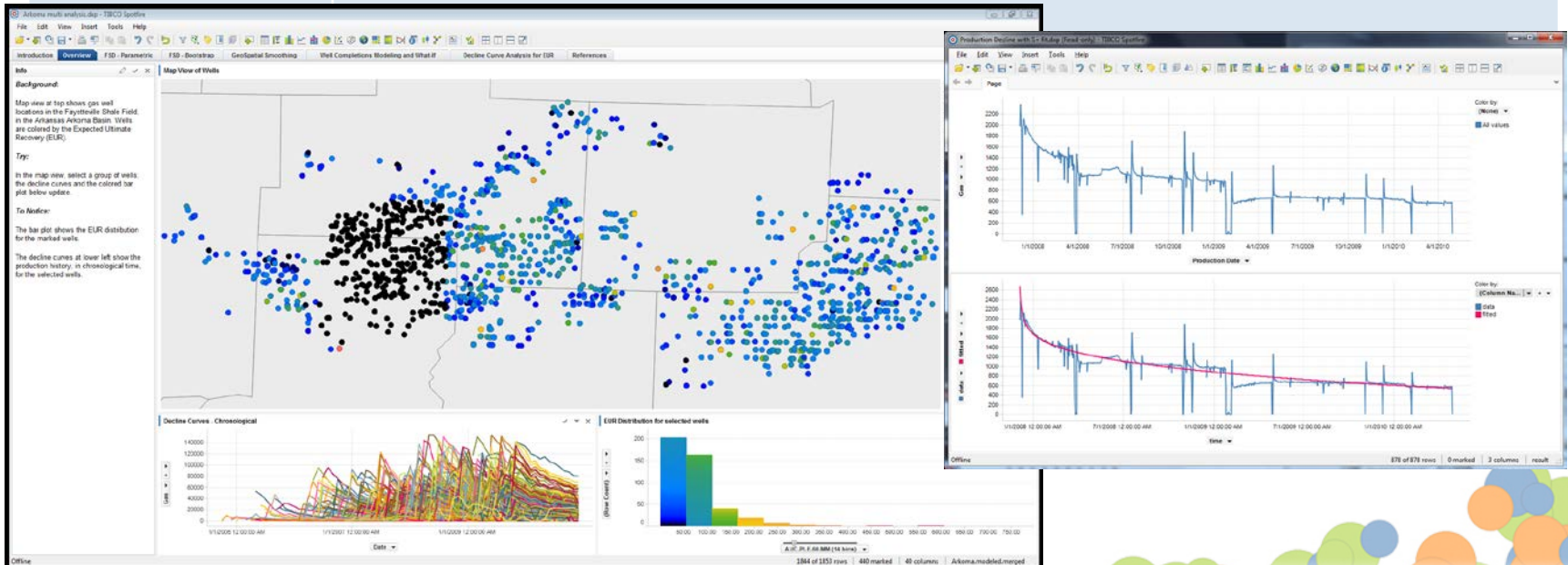
Next Step: The Engineers Desktop

A Platform to build analytical applications for:

- Petro physical properties from cores
- Geochemical data analysis
- Expected ultimate recovery prediction, decline curve analysis
- Integrating Desktop Apps via OpenSpirit
- Monitoring drilling performance
- Bit degradation
- Well information systems by pulling together everything relevant (maps, well header info, production data, geological data, well logs, pressure surveys etc.)
- Injector performance and producer correlation
- Simulation results visualization, history matching
- ... and may more

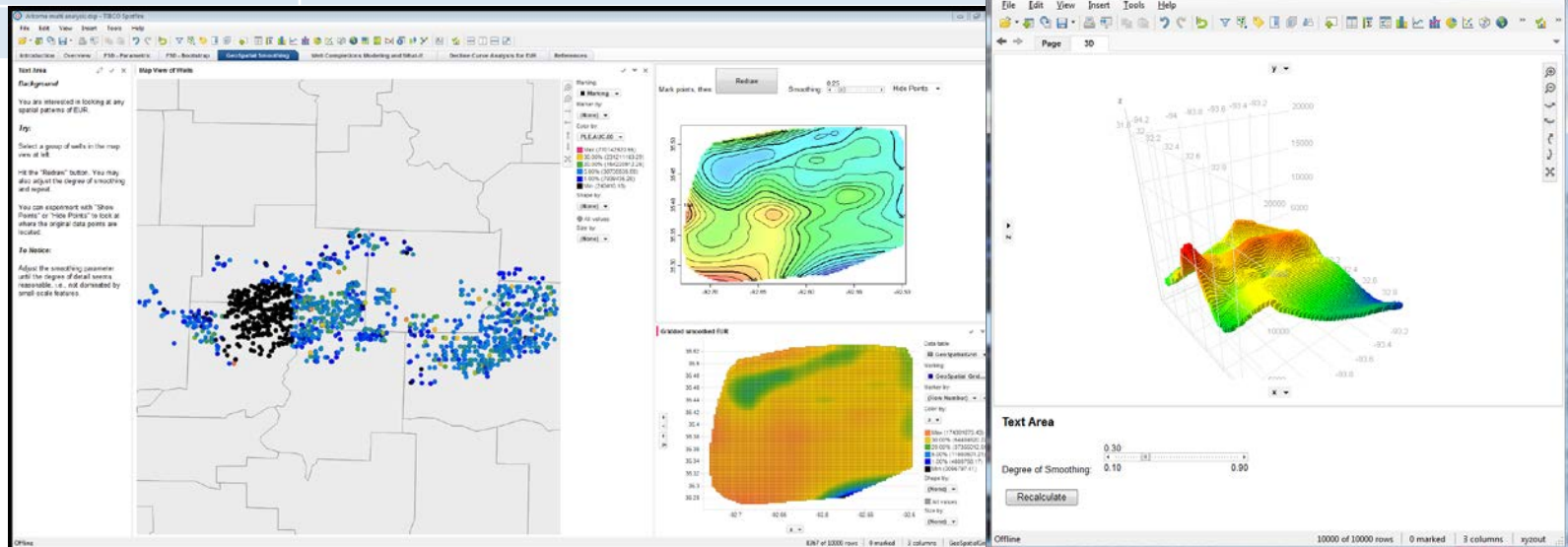
Example : EUR Prediction

Use Case/Solution:	EUR Prediction Decline Curves, Type Curves
Description:	Fit large numbers of gas well production decline curves automatically to make timely assessments of properties and to make forecasts of future production over lifetime of each well.
Department:	Planning
MBO:	VP of resource planning
Business Challenge:	Current software tools cannot scale to fitting thousands of wells. Current fast methods do not leverage the most recent theory from academia. Accurate fitting is essential for evaluating production differences from different operators & drilling techniques.
Value:	Efficient and transparent implementation of modern decline curve fitting methods



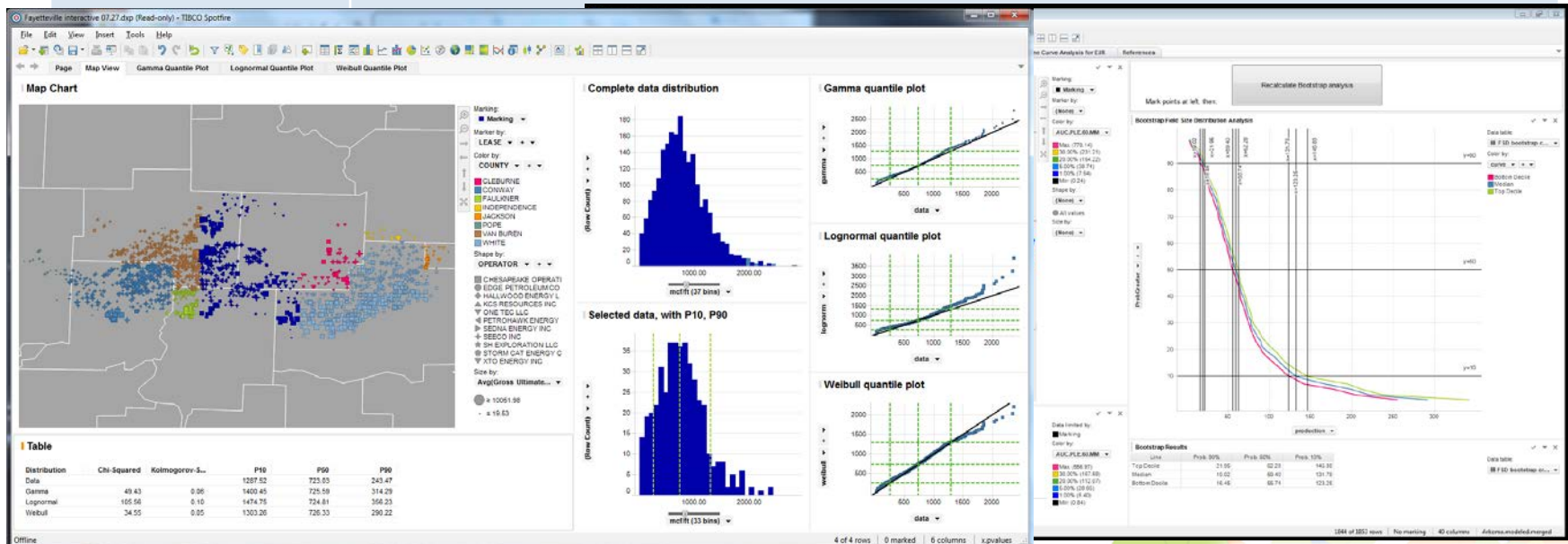
Example : Spatial Mapping of Reserves

Use Case/Solution:	Produce smooth map of oil/gas well lifetime production (EUR)
Description:	Allows users to look for geographic patterns of production in order to plan new wells
Department:	Planning
MBO:	VP of resource planning
Business Challenge:	EUR Data is at geographically scattered points. Variability in data can obscure overall geographic variability so it is difficult to discover production 'hot spots'. Tool is needed to reveal regional patterns.
Value:	From geographically scattered well locations, produce smooth map of potential EUR for planning purposes. Clear and transparent view of geographical variability lets planners value property more accurately and make competitive bids on new property acquisitions, and plan development of existing properties more accurately.



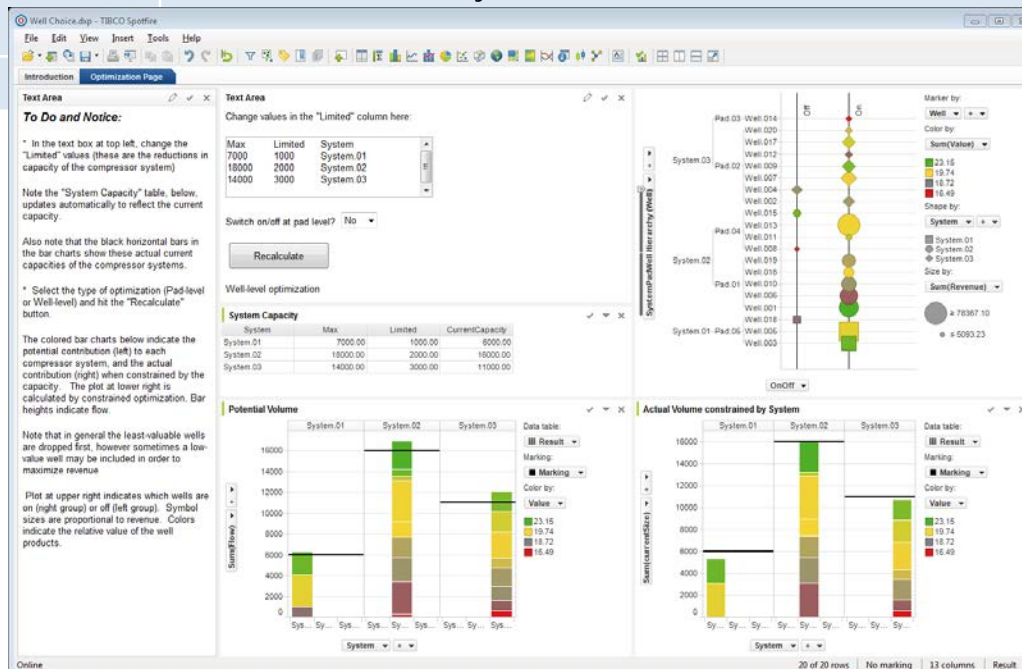
Example : Probabilistic Field Reserve Estimate

Use Case/Solution:	Estimate probable reserves for a future well
Description:	From historical well reserve data for an oil/gas well field, estimate the probable production reserves for a new well at the 10%/ 50%/ 90% probability levels.
Department:	Planning
MBO:	VP of resource planning
Business Challenge:	The potential of a future well is probabilistic. Many current methods assume a particular family (e.g. lognormal) to estimate reserves of a new well, but these methods are least accurate where most needed, in estimating worst/best case scenarios (p10, p90)
Value:	Rapid calculation of familiar solutions (e.g., lognormal) as well as modern methods (bootstrapping) to estimate these critical numbers.



Example : Well Choice

Use Case/Solution:	Choose which gas wells to operate, given limited downstream compressor capacity
Description:	Limited capacity of downstream compressors means not all gas wells can be operated. Solution calculates which wells to operate vs temporarily shut down in order to maximize revenue according to current commodities markets, given finite capacity of downstream compressor capacity
Department:	Planning
MBO:	VP of resource planning
Business Challenge:	Limited compressor capacity means analysts must choose which combinations of wells to operate. Commodities market variability means that individual wells change in relative value from day to day so optimum selection of wells can change as well. Difficult and time-intensive problem to solve without efficient numerical tools.
Value:	Numerical optimization methods can easily find the best combination of wells to operate given the valuation of different hydrocarbon constituents in the Commodities market.



Example: Decline Curve Analysis

Equations used in modeling Decline Curves

Arps Hyperbolic decline

$$q = q_i (1 + b D_i t)^{-1/b}$$

(Arps, 1944)

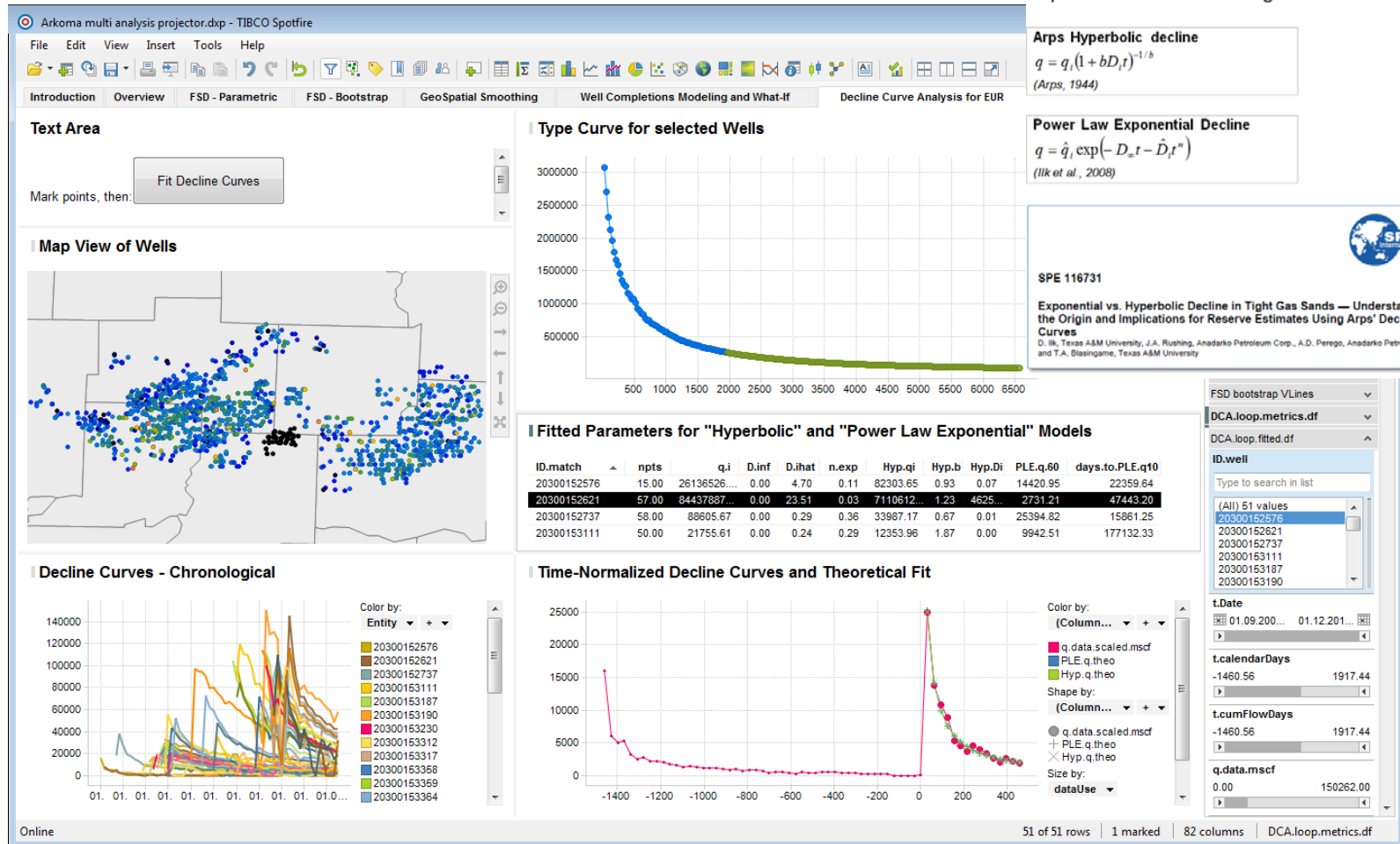
Power Law Exponential Decline

$$q = \hat{q}_i \exp(-D_i t - \hat{D}_i t^n)$$

(Ilk et al., 2008)

SPE 116731

Exponential vs. Hyperbolic Decline in Tight Gas Sands — Understanding the Origin and Implications for Reserve Estimates Using Arps' Decline Curves
D. Ilk, Texas A&M University, J.A. Rushing, Anadarko Petroleum Corp., A.D. Perego, Anadarko Petroleum Corp., and T.A. Blasingame, Texas A&M University



The Prooven Value

Technical Challengers:

- Real Time Production and Drilling Monitoring
- Enterprise Wide Integration and SOA Projects (OpenSpirit Connect)

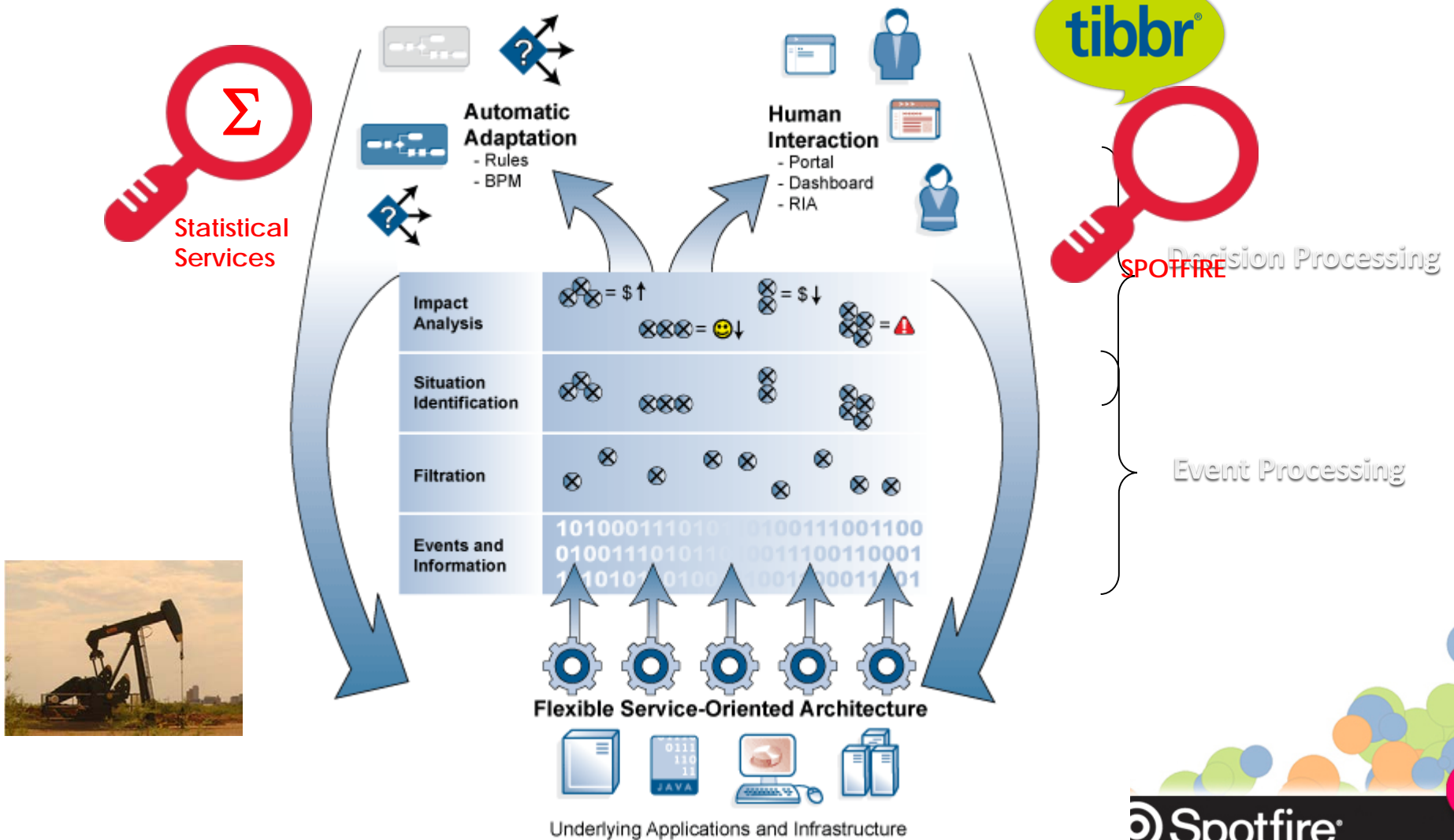
Large Financial and Reputational Impact:

- Non Productive Time Analysis in Drilling Opoperations
- HSSE: Health Safety Security Environment

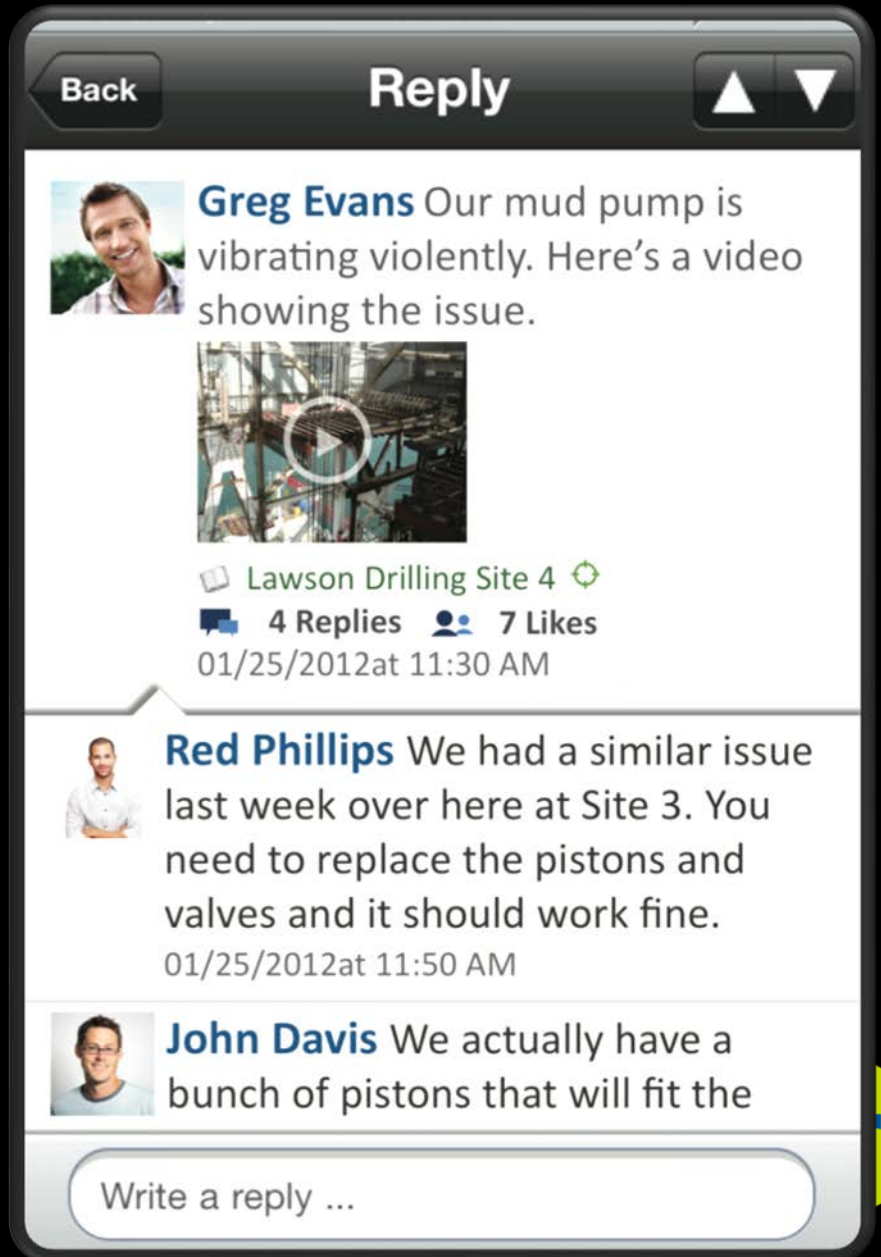
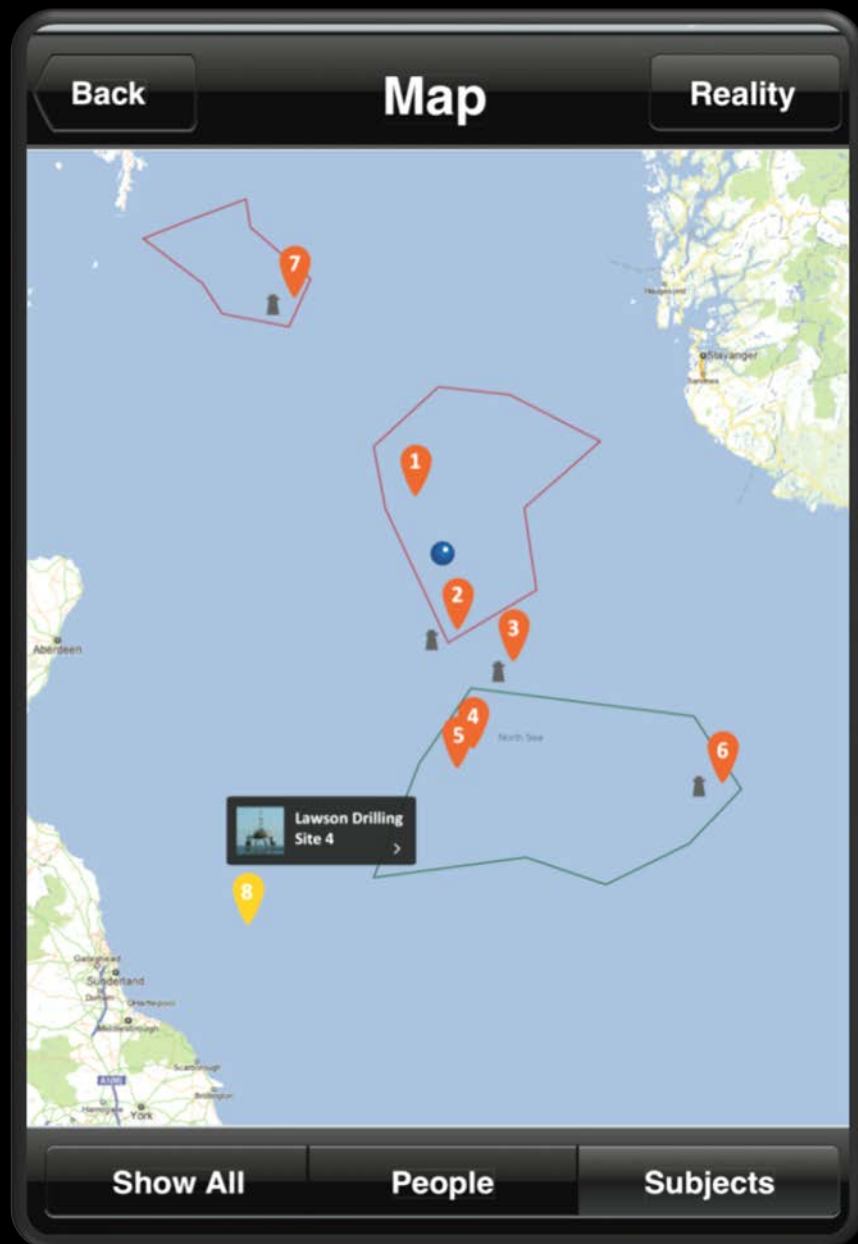
Real Time Production and Drilling Monitoring

- How can I best leverage on my investment in real time data collection
- Data volumes are extremely large and cleaning, validating and aggregating takes too long before I can use real time data
- How can I use the real time data to act on it in a timely fashion?
 - Can I get immediate an alert when a choke is closed and the submersible pump is still running?
 - How can I identify a watercut increase at a specific well and alert all relevant people, even if I do not know all the relevant people
 - How can I associate a pressure drop with a possible tubing corrosion
- How can real time data give the added value to our business processes we expect? Collecting and aggregating real time data (**data in motion**) and move them in a dumb way to the production data base (**data at rest**) does not justify the investment.
- Can I use my predictive simulation results and compare real time data against them? Can a recalibration of the model be triggered automatically ?

TIBCO Reference Architecture for Complex Event Processing



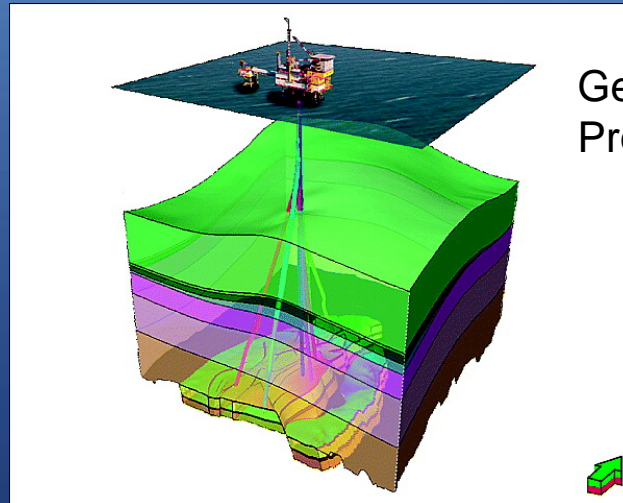
Harness the collective intelligence of an Oil Well



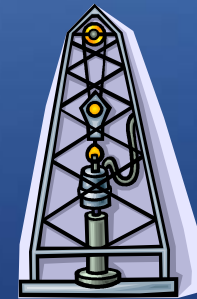
Integration in the G&G Domain

Reservoir Engineering GeoFrame to Well Master

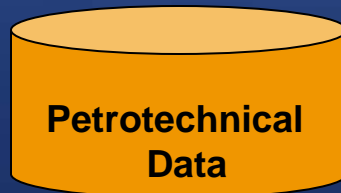
★ Time Optimization



GeoFrame
Project



Well Master



Petrotechnical
Data

TIBCO EMS Messaging

- Data available to multiple systems
- Reliable delivery



Well
Data

TIBCO OpenSpirit

- Connectivity
- Abstracted data model
- Coordinate and unit system awareness

TIBCO OpenSpirit Connect

- PPDM support built in



WELL DATA

"COMPLETION DATE, TOTAL DRILL DEPTH, TOTAL DRILL
DEPTH UNIT OF MEASURE, SURFACE LATITUDE, SURFACE
LONGITUDE, WELL NAME"

Takeaway where TIBCO can help:

- Complex Event Processing and Real Time Analytics is the Solution to leverage on your investment in automatic data collection from production and drilling operations.
- Use of a horizontal platform for SOA and analytics guarantees cost effectiveness of the solution by scalability into upstream activities but also to organization units outside of E&P
- Enterprise Social Media leverages on the collective intelligence of the company and helps to transfer knowledge from experienced engineers to young professionals without creating disruptions in the business



Thank You

