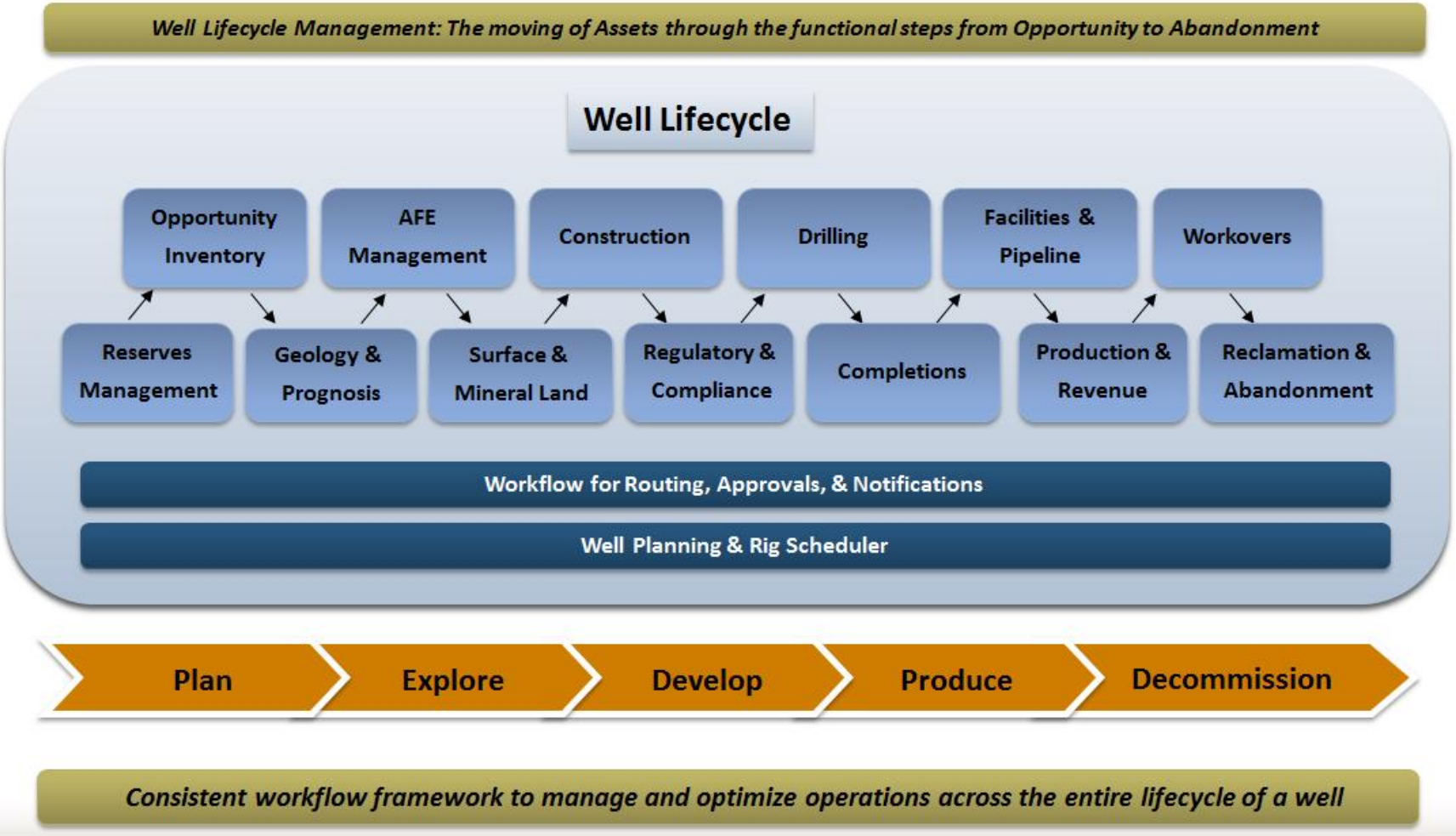
REALTIME DRILLING DATA

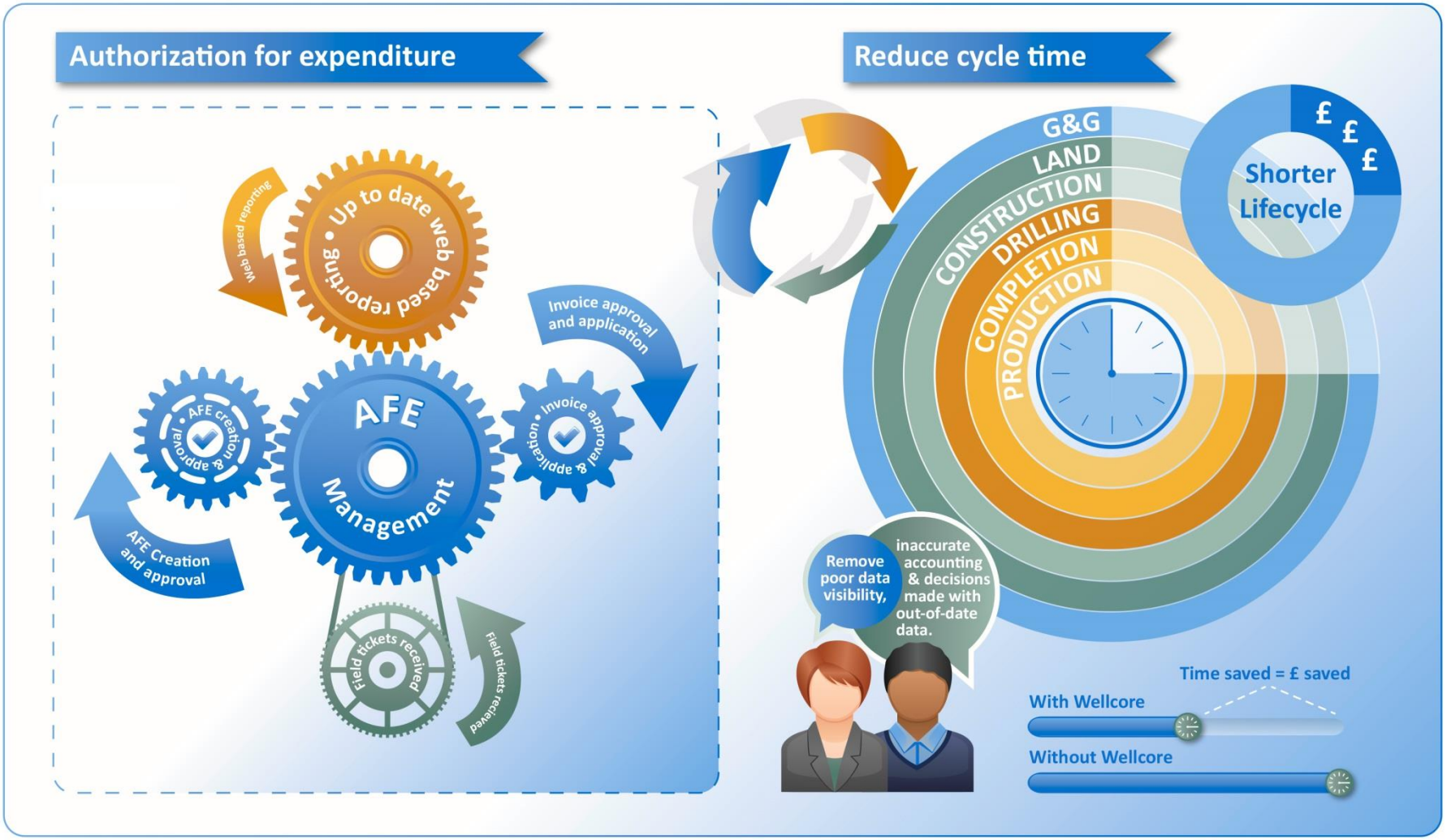
How to get a steady stream of data from the rig

ANDY COWARD, 19-2-14

Typical Well Lifecycle Process

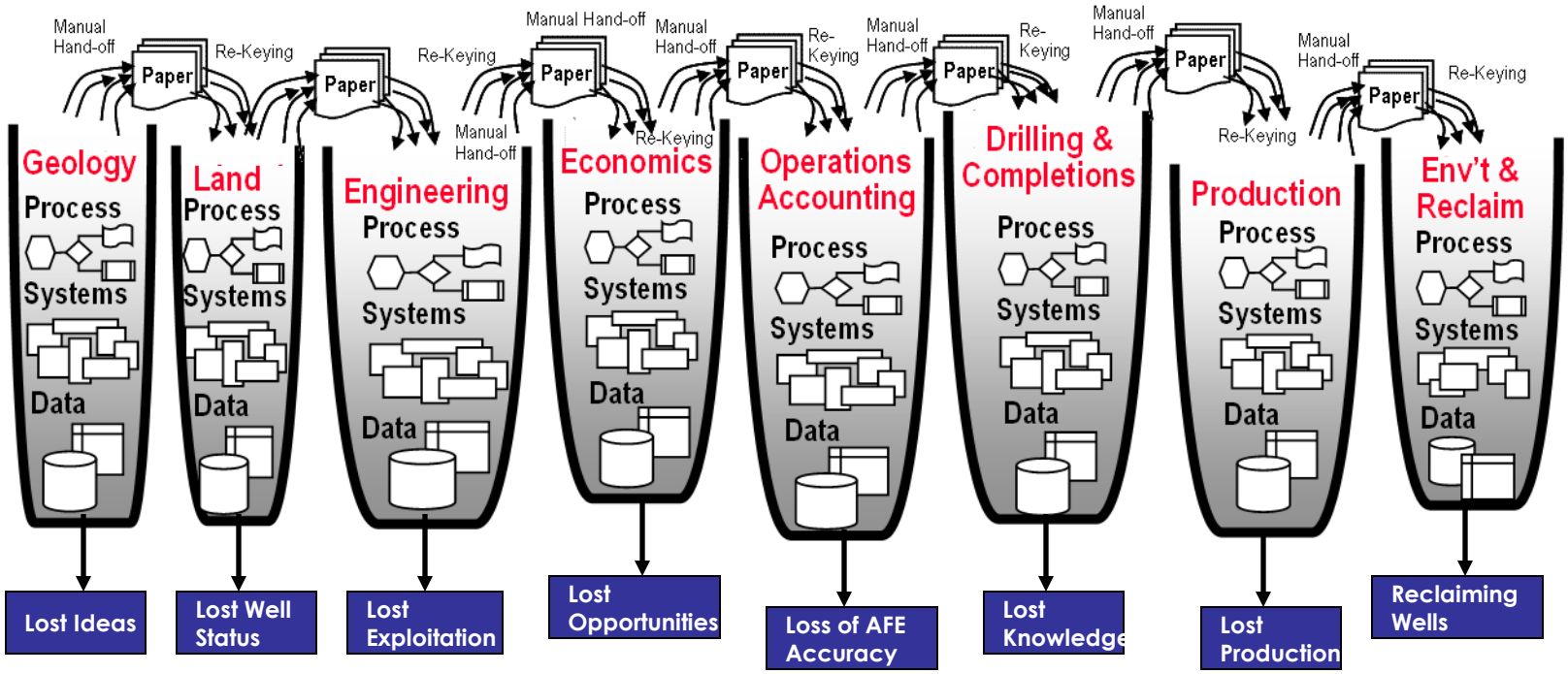


A Value Proposition on Drilling



Common E&P Operations Workflow

Encapsulated Processes, Systems and Data - a Barrier to Efficient Operations



Six Sigma

- Simple definition
  - Define
  - Measure
  - Analyse
  - Improve
  - Control

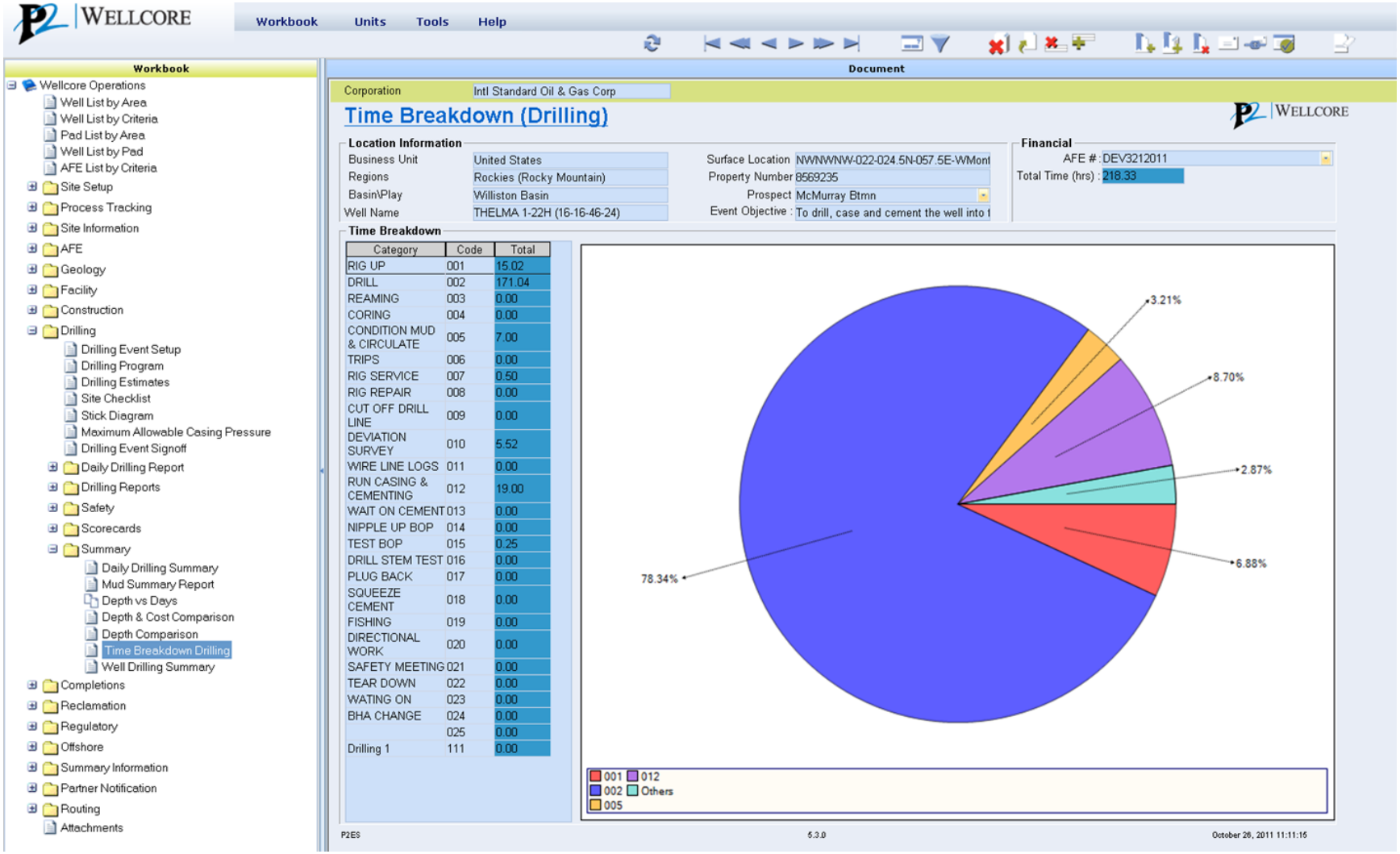
- If you don't measure something, how can you control it?

Question

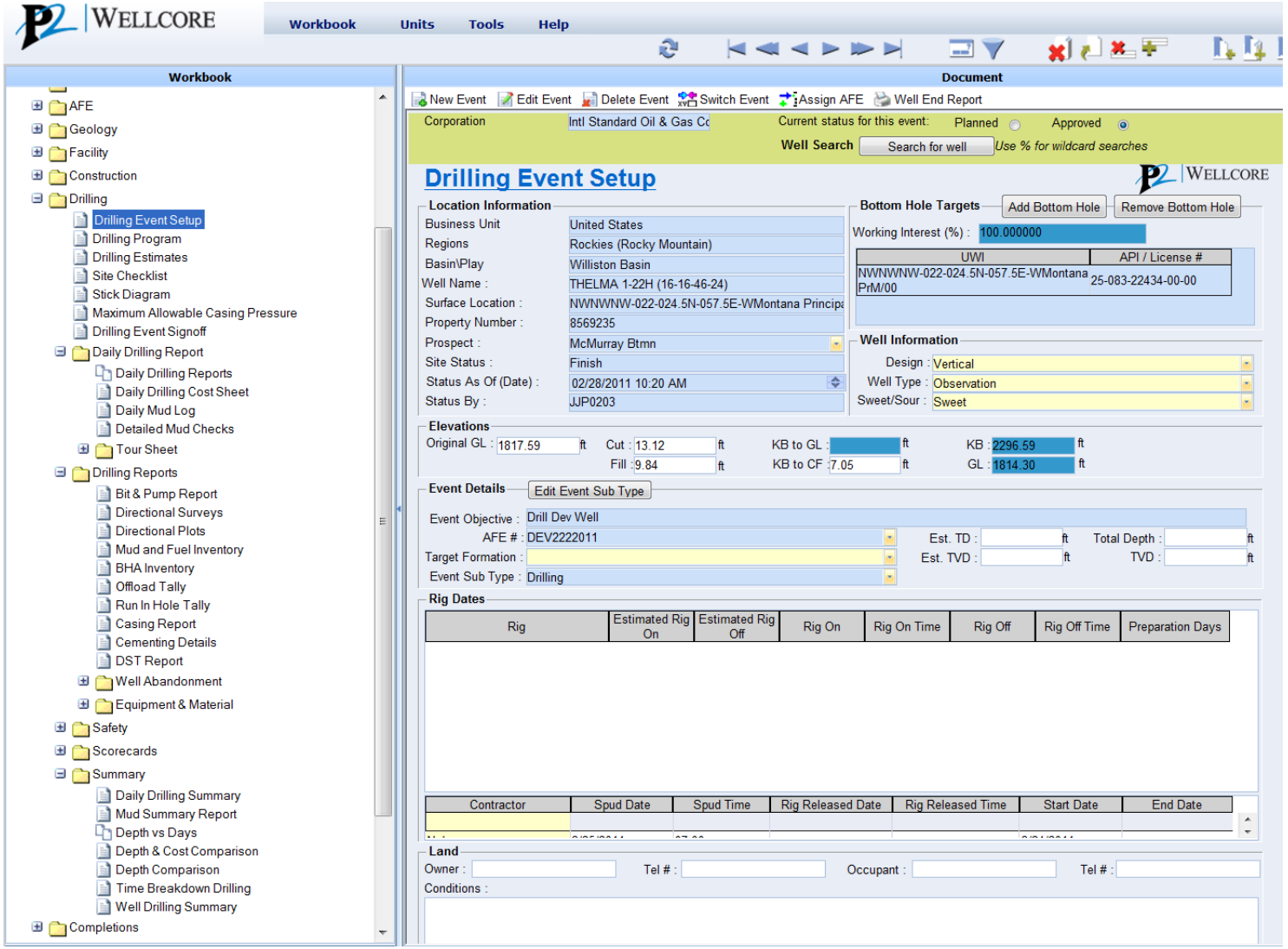
- How is drilling data analysed in context?
- How is learning and best practice captured?
  - How is best performance captured?
  - How is worst performance avoided?

- Is data transferred on paper (Excel?)

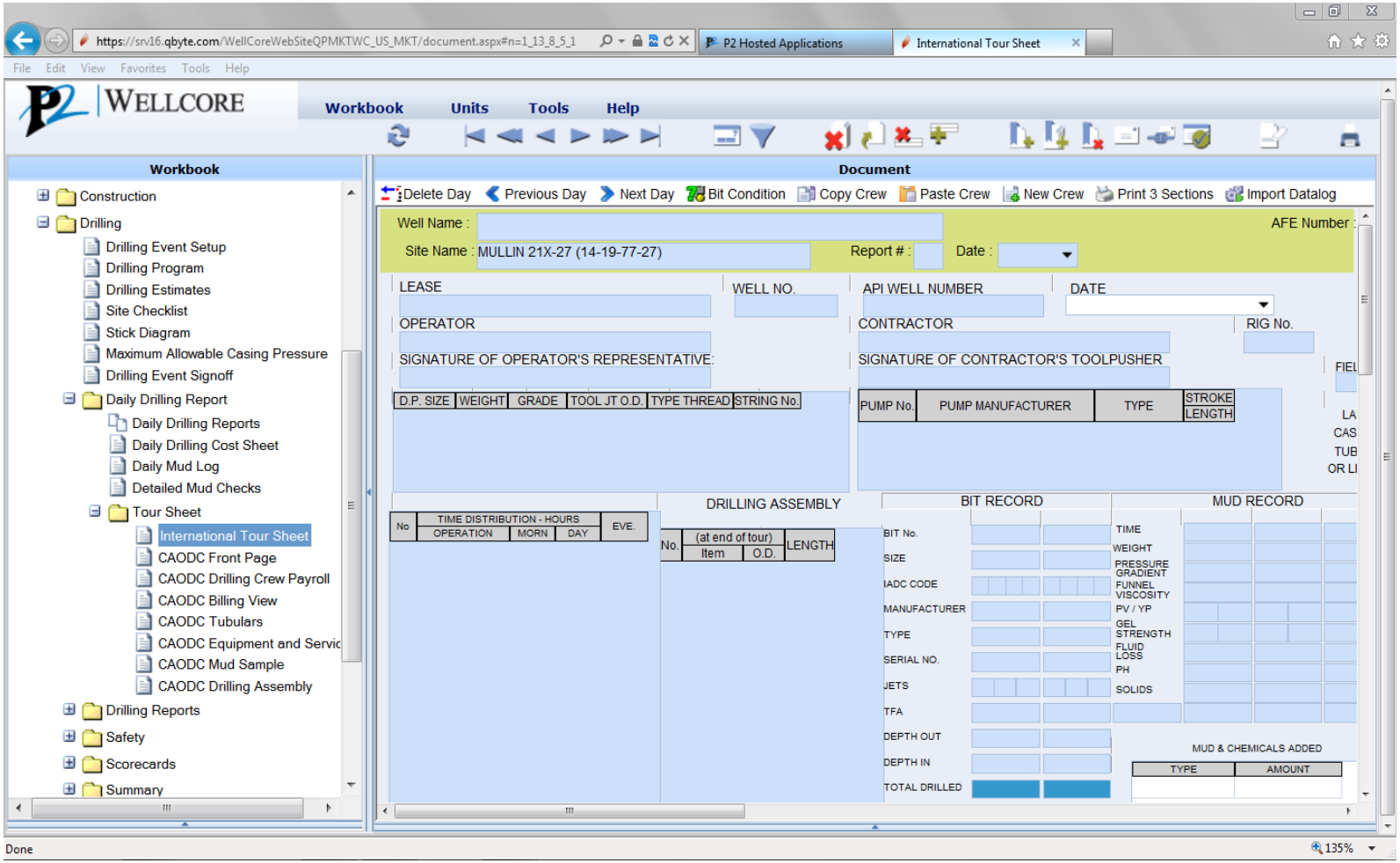
Typical Drilling Reports



Drilling Analysis



Standard Tour Sheet



Typical Daily Report

Daily Drilling Report P1

P2 | WELLCORE

Location Information

Business Unit	United States
Regions	Rockies (Rocky Mountain)
Basin\Play	Williston Basin
Well Name	THELMA 1-22H (16-16-46-24)
Property Number	8569235
Prospect	McMurray Btmn

Report Information

Report # : 10 Report Date : 8/7/2013

Bottom Hole Targets

UWI	API / License #
NWNWNW-022-024.5N-057.5E-WMontana PrW/00	25-083-22434-00-00

Financials

Daily Cost : $577,440 Cost to Date : $3,806,557

AFE # : DEV3212011

AFE : $2,290,705 AFE Cost to Date : $3,822,956

Operations

Event Objective : To drill, case and cement the well into the Lower Zone and hand well over to completion.

A.M. Ops : Drill 311mm production hole

Ops Forecast : Drill 311mm Hole to TD, Prepare for Cement & Casing

24hr. Summary : Drill 311mm Hole 1810-1900, C&C

Planning Status : Cancelled

Elevations

KB to GL : 17.00 ft KB : 1831.30 ft GL : 1814.30 ft Reserve Pit Freeboard : 0.00 ft

Progress

Days from Spud : 866 Progress : 6233.60 ft MD at Report Time : 6233.60 ft

Rig on Location (days) : 10 Est. TD : 6233.60 ft TVD At Report Time : 0.00 ft

Event Dates

Spud Date	Spud Time	Suspended Drilling Date	Resume Drilling Date	Total Depth Date	Total Depth Time	Finished Drilling Date	Finished Drilling Time	Rig Released Date	Rig Released Time
3/25/2011	07:00			3/25/2011	08:45				

Time Breakdown

Start Time : 06:00 Rotating Hours : 0.00 Total Rotating Hours : 15.00 Total Hours : 40.25 Time Code : DRILL

Start Time	End Time	Hours	Phase	Activity Time Code	Activity Description	NPT	Bit #	Run #	Depth (ft)	Remarks
06:00	14:00	8.00		002	DRILL	No			5938.32	
14:00	14:15	0.25		007	RIG SERVICE	No			5938.32	
14:15	14:30	0.25		010	DEVIATION SURVEY	No			5938.32	
14:30	21:30	7.00		002	DRILL	No			6069.55	

P2®

Drilling Schematic – Day x

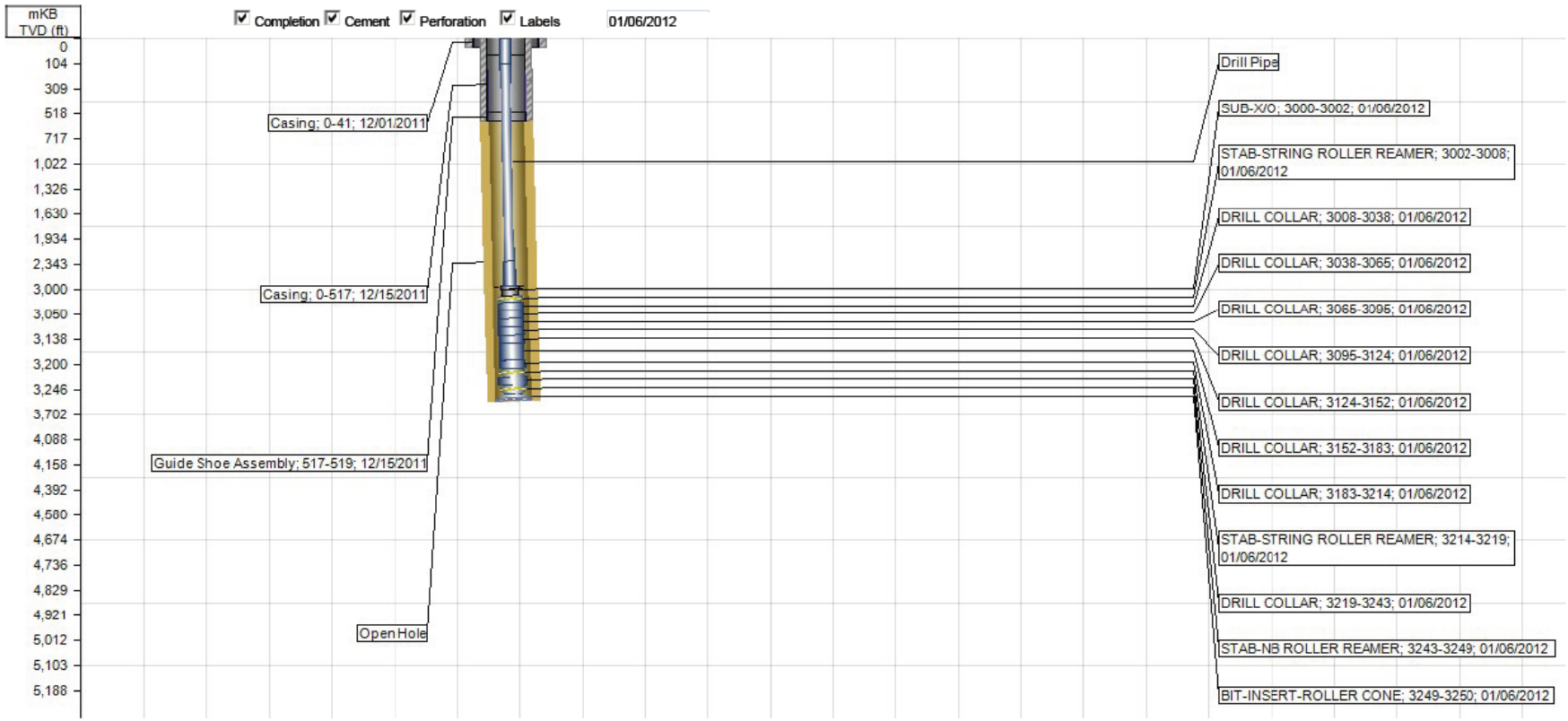
Horizontal Downhole Schematic

WELLCORE

Location Information

Business Unit	United States	Surface Location :	NENENE-031-025.5N-053.5E-WMontana Principal
Regions	Rockies (Rocky Mountain)	Bottom Hole Location :	NENENE-031-025.5N-053.5E-WMontana PrM/00
Basin\Play	Williston Basin	Property Number :	8563656
Well Name	FISHER 4-31 (04-05-59-22)	Prospect :	

API/Licence # :	25.083-22255-00-00			County :	RICHLAND
Summary Name :	Default				
GL :	724.00 ft	KB to GL :	17.00 ft	KB :	741.00 ft
Summary Sections :	Casing Details, String Summary, Cementing Details, Perforations, Rod Strings, User C				



Drilling Schematic – Day x+4

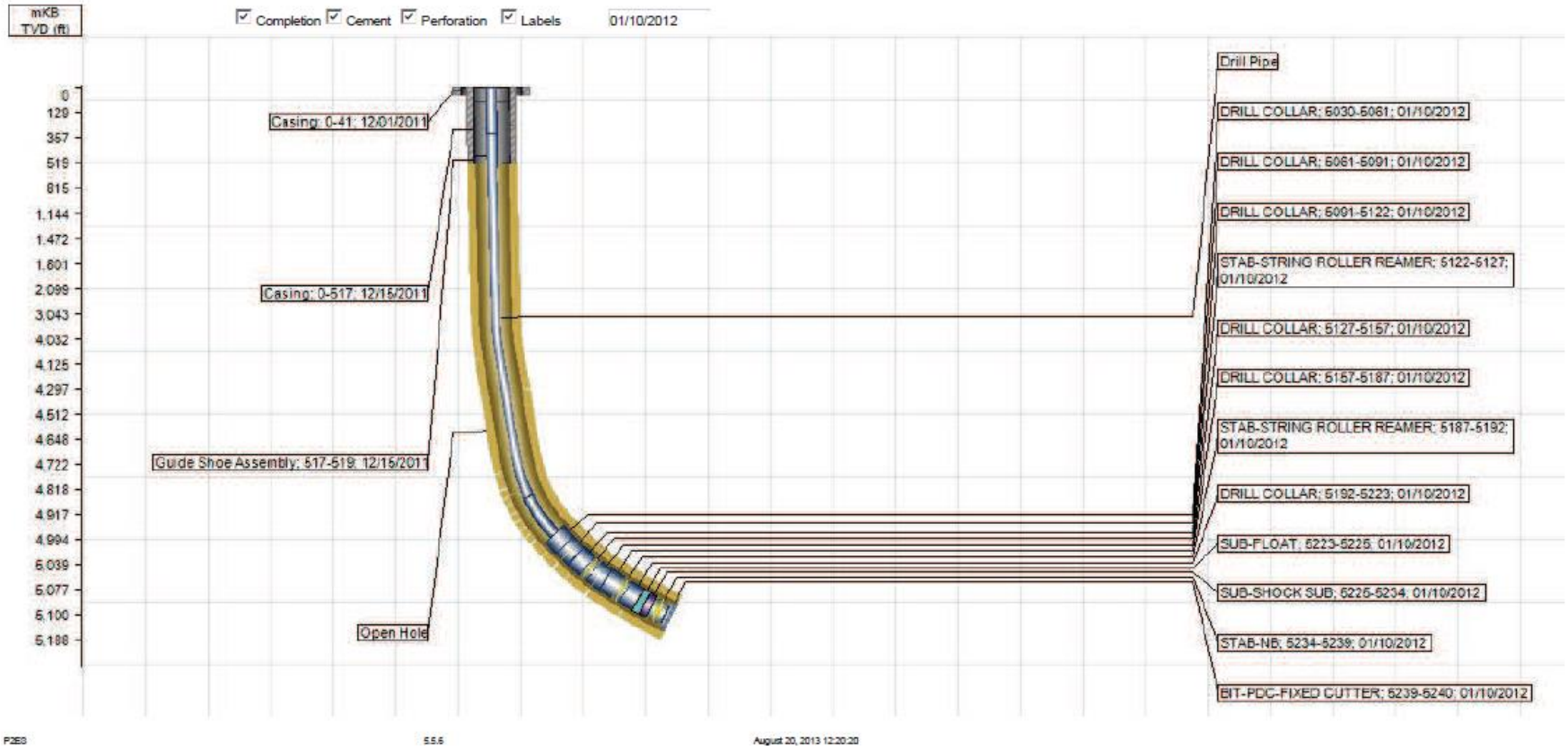
Horizontal Downhole Schematic

WELLCORE

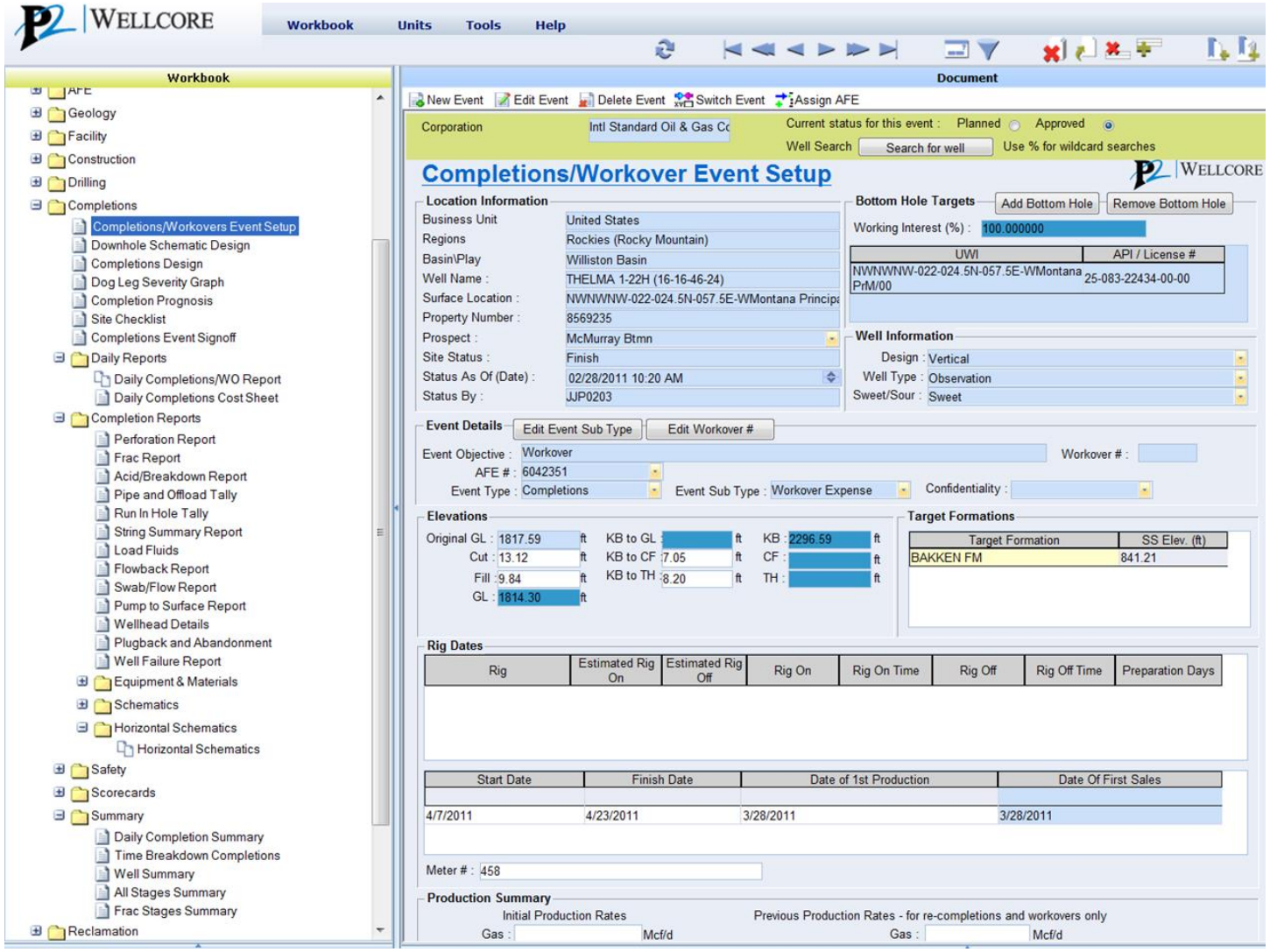
Location Information

Business Unit	United States	Surface Location :	NENENE-031-025.5N-053.5E-WMontana Principal
Regions	Rockies (Rocky Mountain)	Bottom Hole Location :	NENENE-031-025.5N-053.5E-WMontana PrM/00
Basin\Play	Williston Basin	Property Number :	8563656
Well Name	FISHER 4-31 (04-05-59-22)	Prospect :	

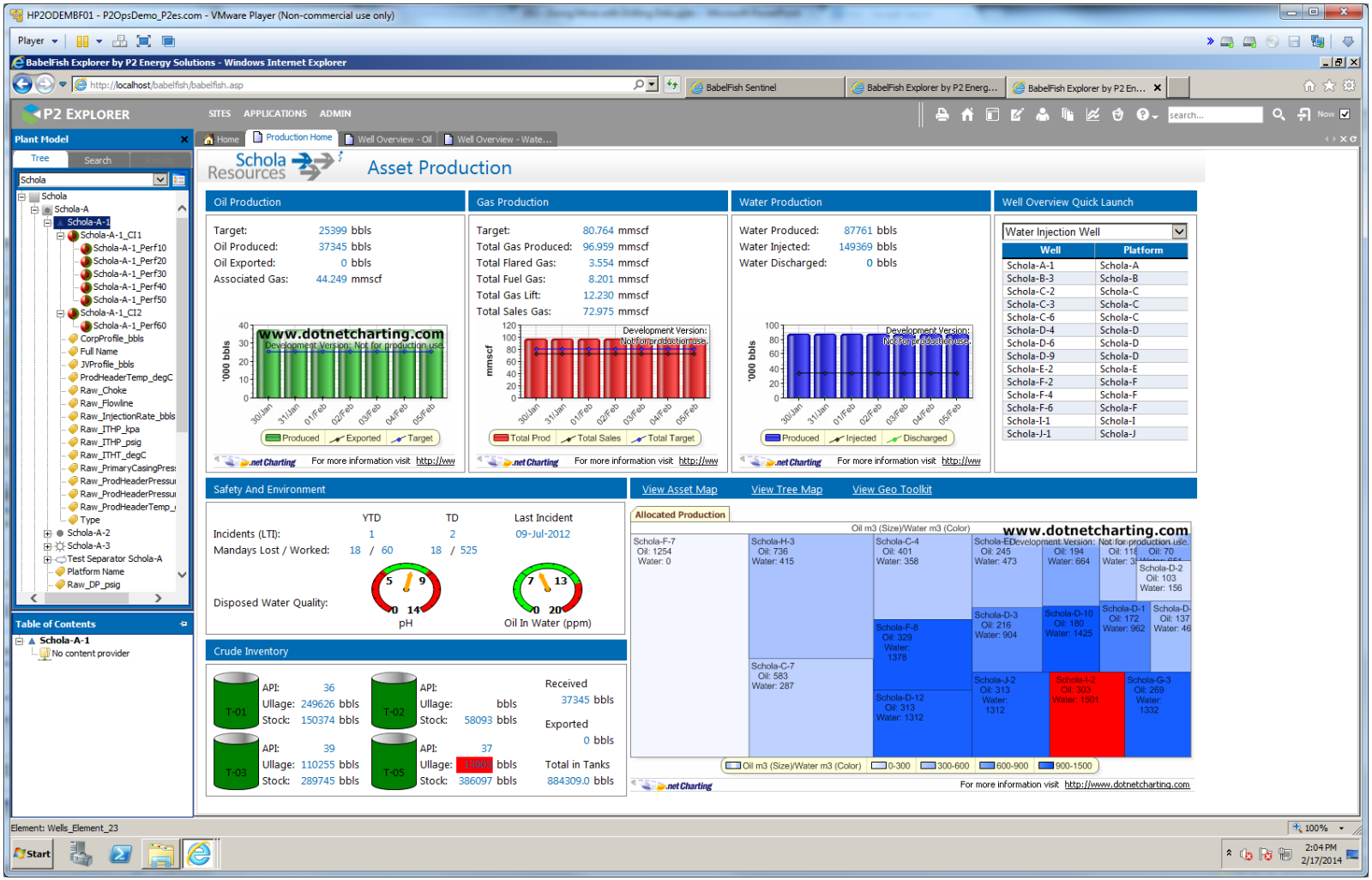
API/Licence # :	25.083-22255-00-00			County :	RICHLAND
Summary Name :	Default				
GL :	724.00 ft	KB to GL :	17.00 ft	KB :	741.00 ft
Summary Sections :	Casing Details, String Summary, Cementing Details, Perforations, Rod Strings, User C				



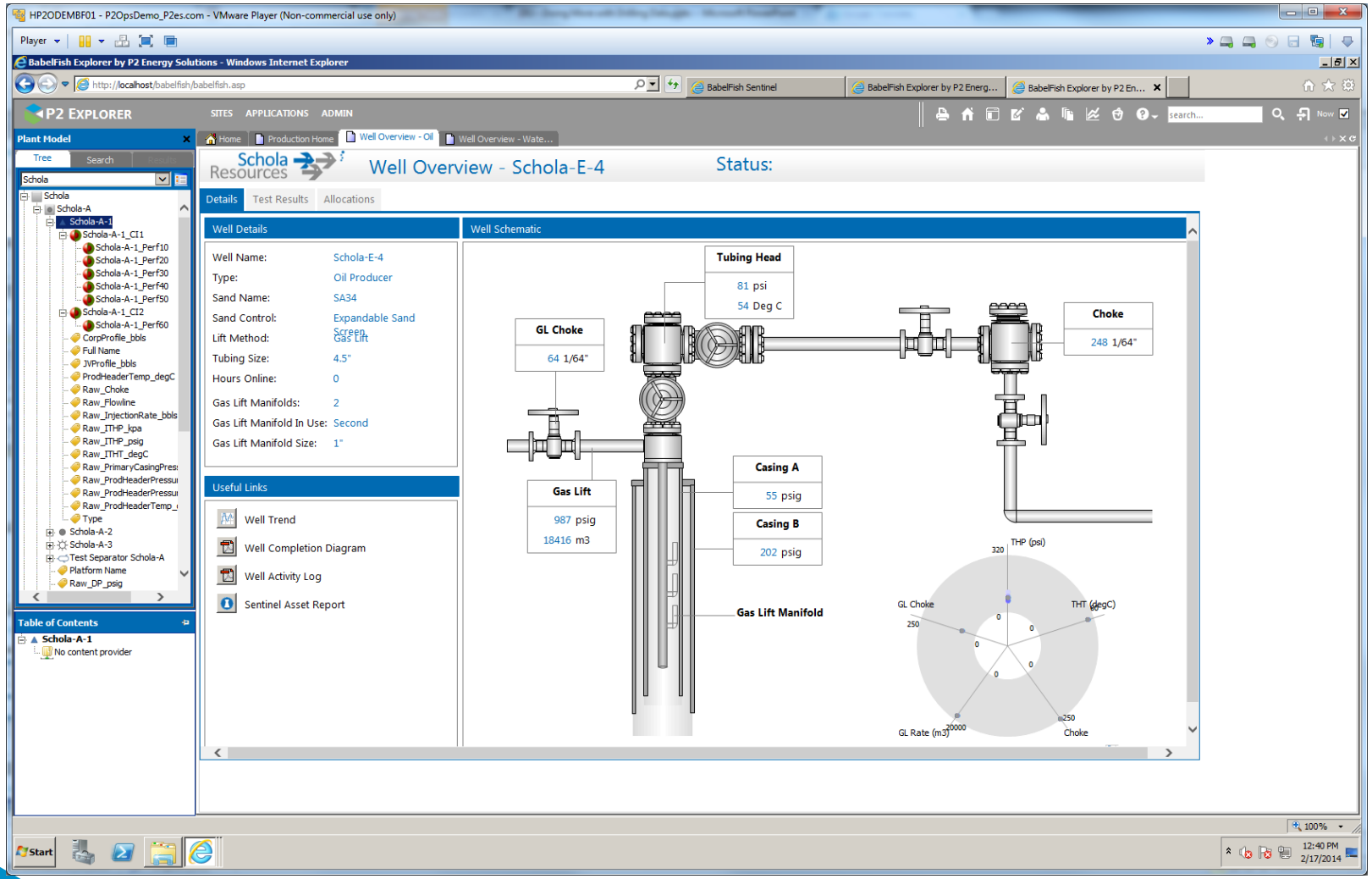
Completions Summary



Contextual Data Federation



Near Real-Time Data – as is



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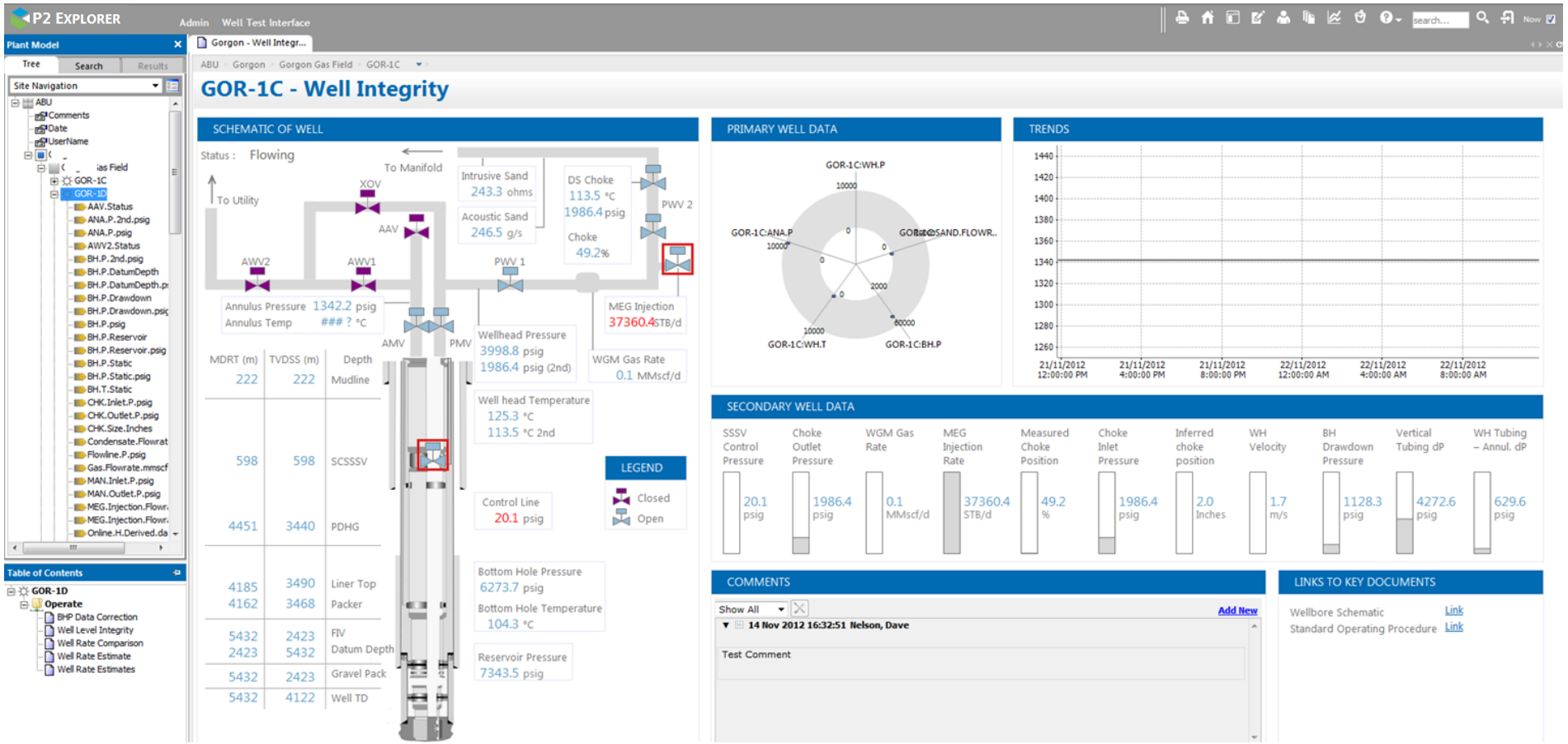

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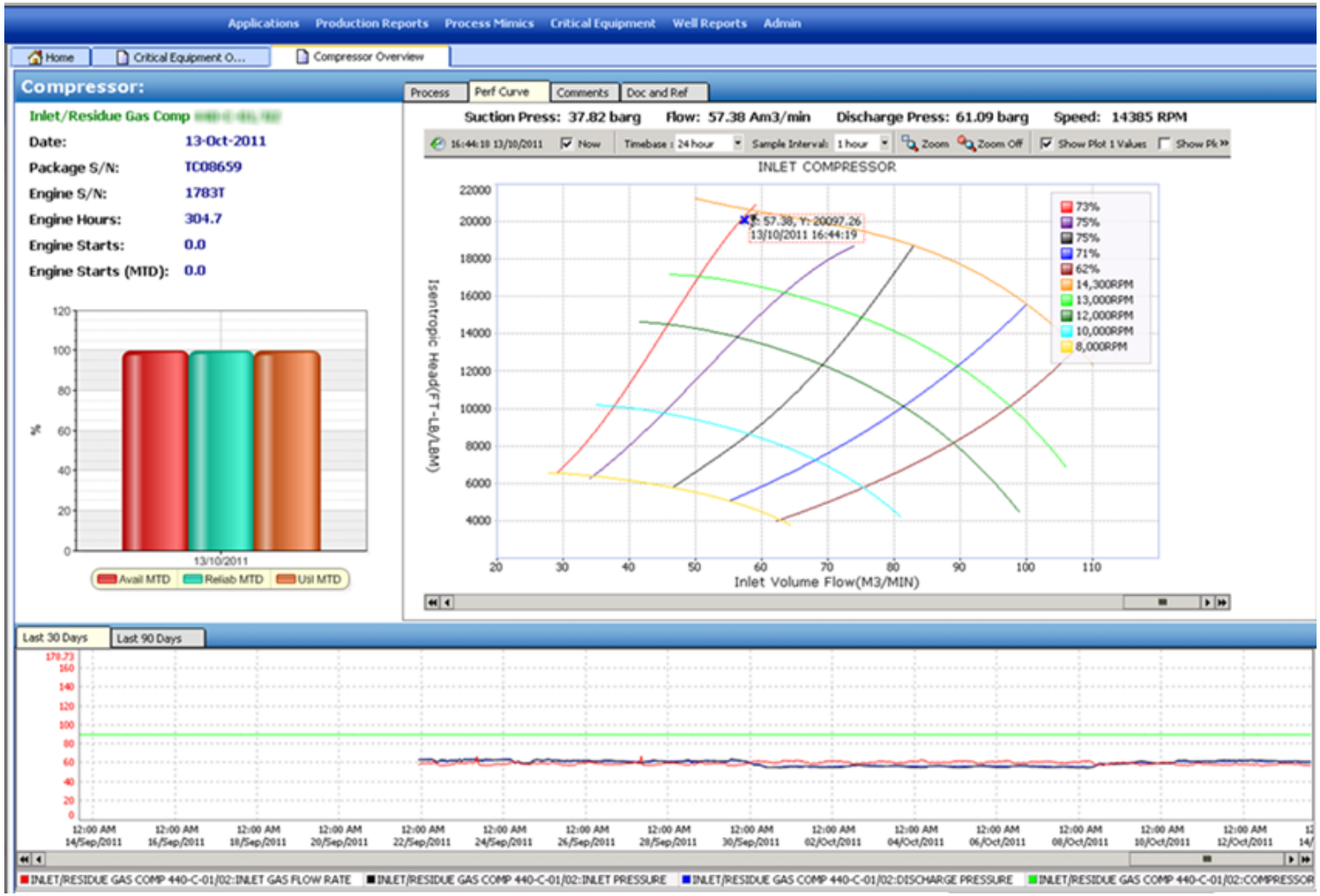
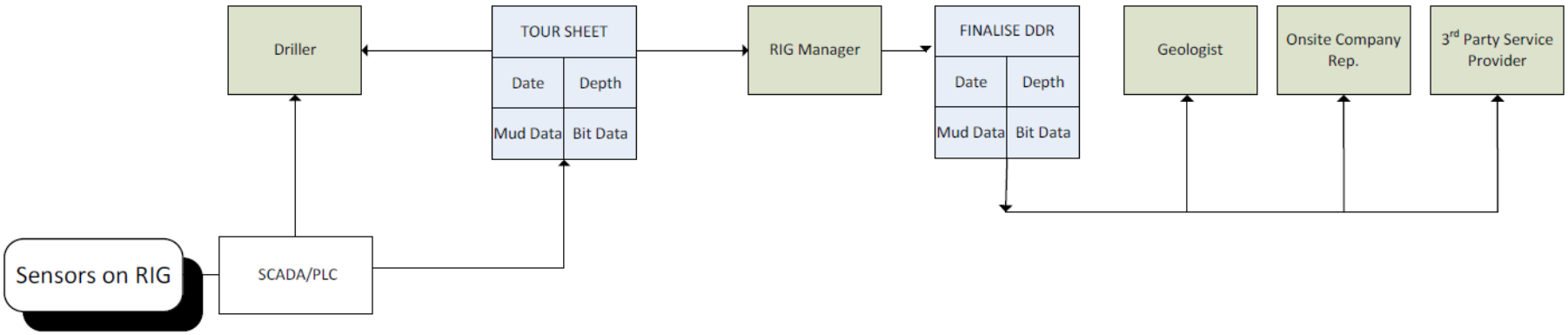
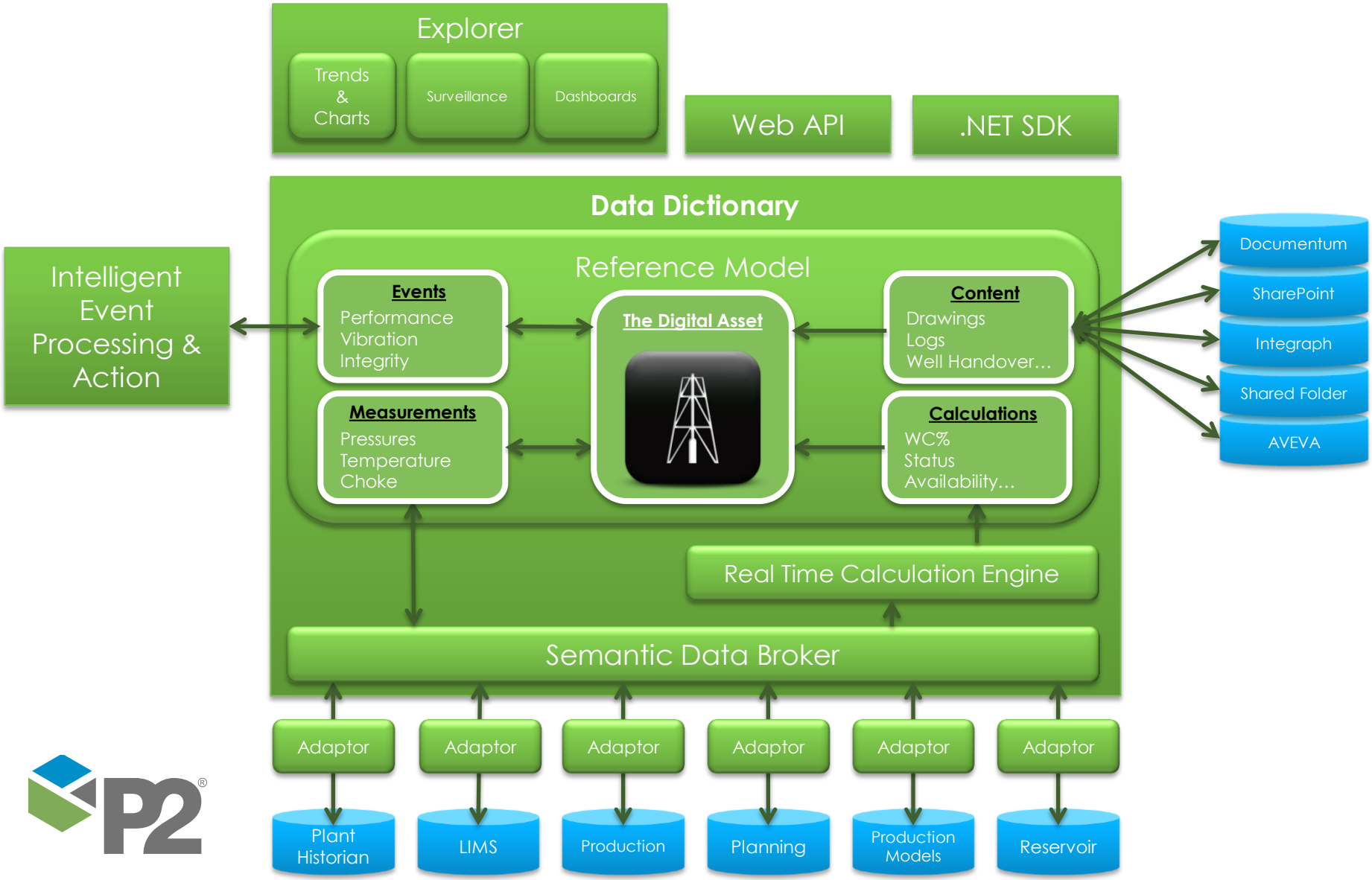


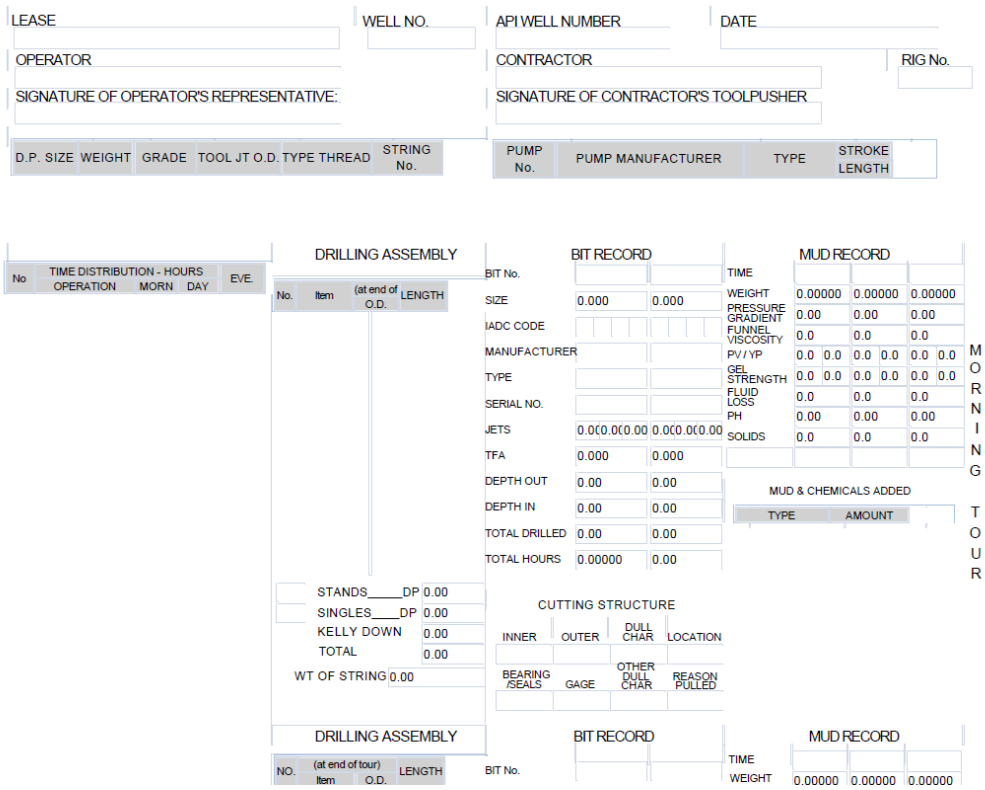
TOUR Reports – As Is



How Do We Get Data to Federate?



Tour Report – XML based



LEASE | WELL NO. | API WELL NUMBER | DATE

OPERATOR | CONTRACTOR | RIG No.

SIGNATURE OF OPERATOR'S REPRESENTATIVE: | SIGNATURE OF CONTRACTOR'S TOOLPUSHER

D.P. SIZE | WEIGHT | GRADE | TOOL JT O.D. | TYPE THREAD | STRING No. | PUMP No. | PUMP MANUFACTURER | TYPE | STROKE LENGTH

No | TIME DISTRIBUTION - HOURS OPERATION | MORN | DAY | EVE.

DRILLING ASSEMBLY

No. | Item | (at end of O.D. | LENGTH

STANDS____DP 0.00
SINGLES____DP 0.00
KELLY DOWN 0.00
TOTAL 0.00
WT OF STRING 0.00

BIT RECORD

BIT No.		
SIZE	0.000	0.000
IADC CODE		
MANUFACTURER		
TYPE		
SERIAL NO.		
JETS	0.0(0.0(0.00	0.0(0.0(0.00
TFA	0.000	0.000
DEPTH OUT	0.00	0.00
DEPTH IN	0.00	0.00
TOTAL DRILLED	0.00	0.00
TOTAL HOURS	0.00000	0.00

MUD RECORD

TIME			
WEIGHT	0.00000	0.00000	0.00000
PRESSURE GRADIENT	0.00	0.00	0.00
FUNNEL VISCOSITY	0.0	0.0	0.0
PV / YP	0.0 0.0	0.0 0.0	0.0 0.0
GEL STRENGTH	0.0 0.0	0.0 0.0	0.0 0.0
FLUID LOSS	0.0	0.0	0.0
PH	0.00	0.00	0.00
SOLIDS	0.0	0.0	0.0

MUD & CHEMICALS ADDED

TYPE | AMOUNT

CUTTING STRUCTURE

INNER | OUTER | DULL CHAR | LOCATION

BEARING /SEALS | GAGE | OTHER DULL CHAR | REASON PULLED

DRILLING ASSEMBLY

NO. | (at end of tour) Item | O.D. | LENGTH

BIT RECORD

BIT No.

MUD RECORD

TIME

WEIGHT 0.00000 0.00000 0.00000

MORNING TOUR

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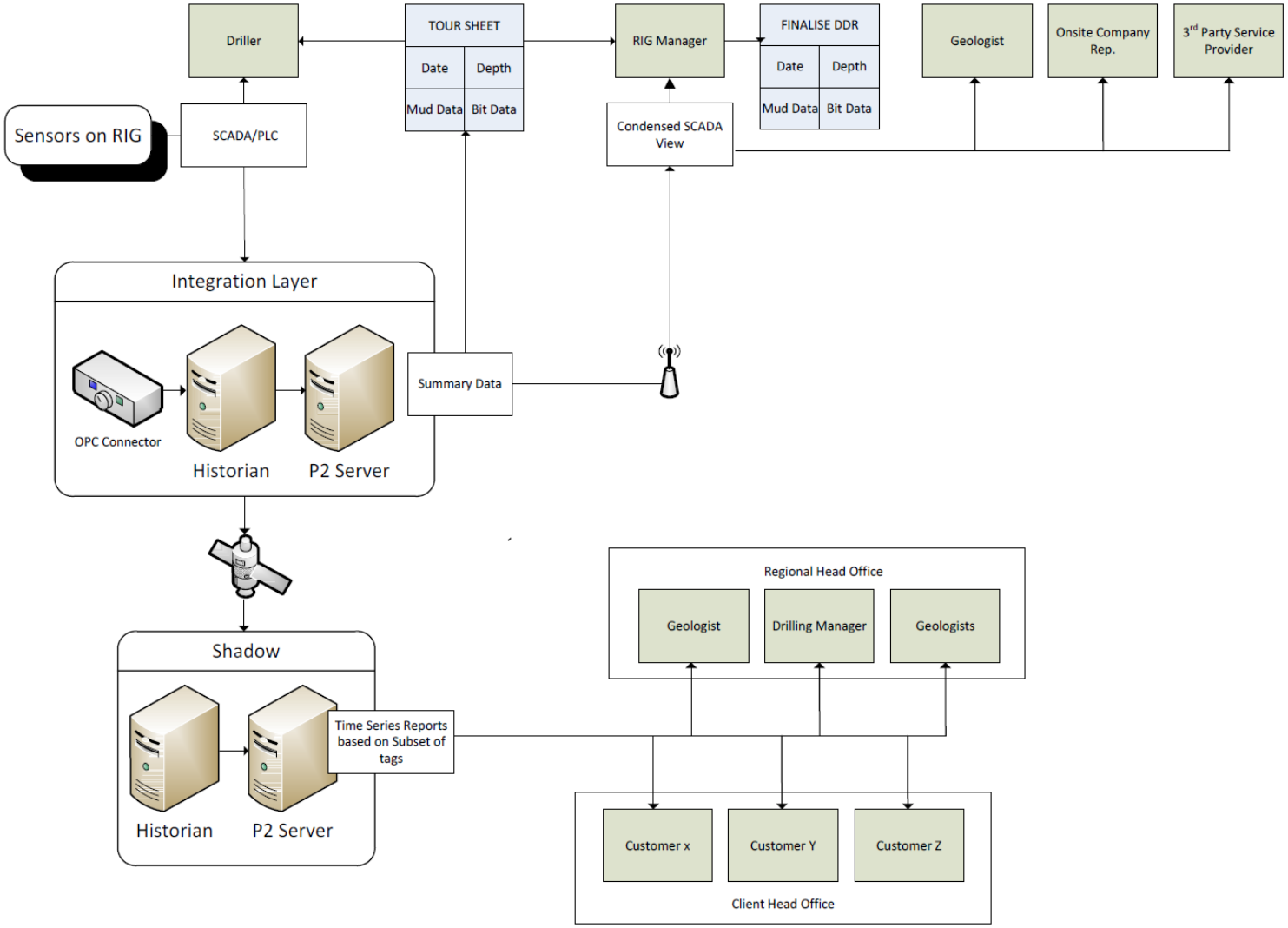
How Do We Get Drilling Data?



Next Steps

- Determining visualisation options for desktop data
  - Getting the data ✓
  - Federating the data ✓
  - Visualising the data ✓
  - Creating specific visualisation templates ✓

Summary

- Data is everywhere…
  - Turning data into knowledge is harder
  - Federating knowledge and driving action is key
- It is only a matter of time!

EMPOWERING PEOPLE
WHO POWER THE WORLD