

Getting the most from your Digital Oilfield by leveraging the full PI Suite

Presented by: Denis Gauder



Outline

- Introduction
- What is Digital Oilfield (DOF) and why does it need real-time data?
- Enhance DOF with PI System
 - Connect PI System data to models
 - Enhance and scale with PI Asset Framework (AF)
 - Exploit the power of data analytics
 - Ease custom development with PI Developer Technologies
- Conclusion

IPCOS Introduction



Over **500 projects** in **50 locations** in **30 countries**
15 years of experience, 65 engineers, offices in Europe, US, India and UAE



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What is the Digital Oilfield?

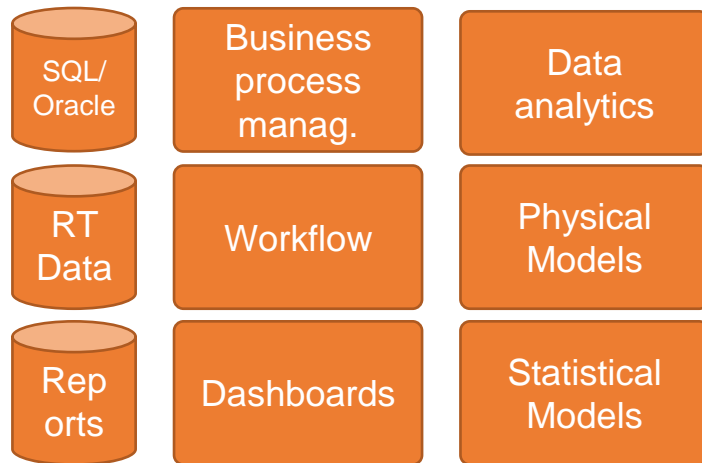
Historically:

Workflows leveraging both physical models and frequent data



Today:

Set of tools and methods assisting execution of key business processes by using models and data



What business processes can DOF support?



Production Surveillance

Virtual meter

Operating envelopes



Production Allocation

Well test validation

Production reconciliation



Production Optimisation

Artificial lift optimisation

Routing optimisation



Flow Assurance

Transient simulations

Detection of deposits



Production Forecasting

Integrated forecast

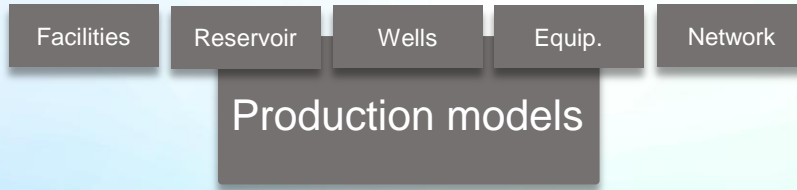
Data-driven forecast

What are the typical Challenges with DOF?

- The need to integrate a variety of technologies and data sets from a multitude of vendors
- The need to visualize data in an integrated fashion
- The need to serve the data to third party applications or engines

Enhance DOF with the PI System

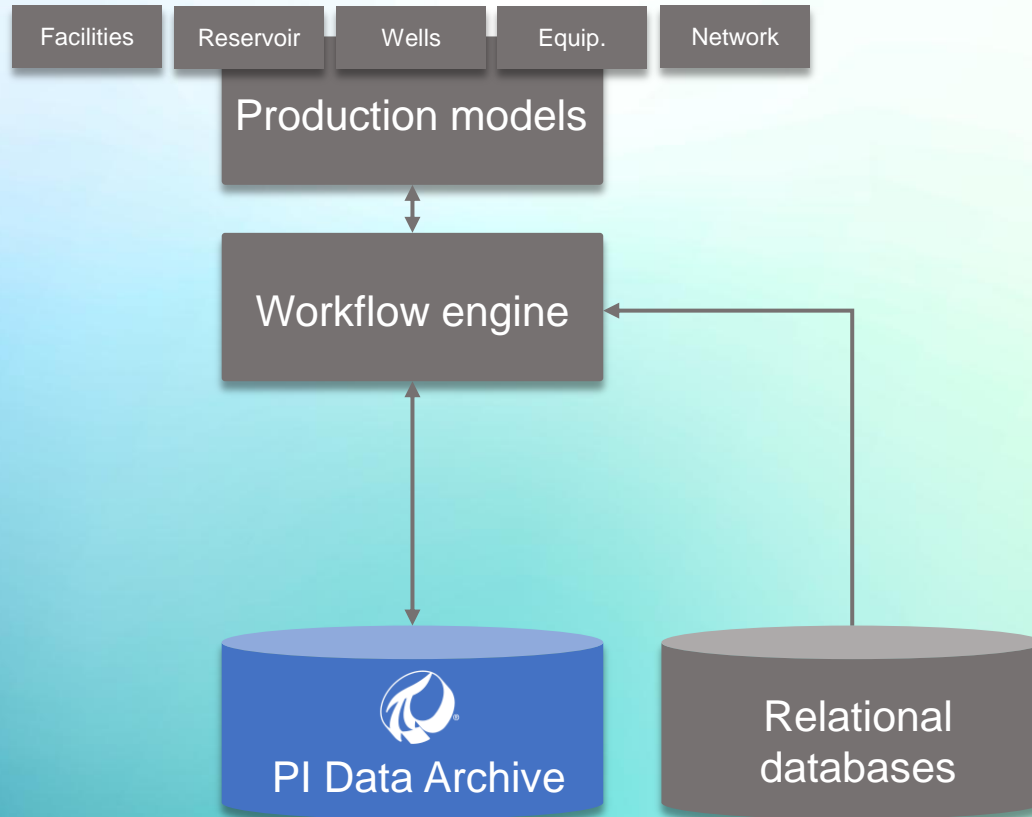
Connect PI data to models



?



Connect PI System data to models - historically

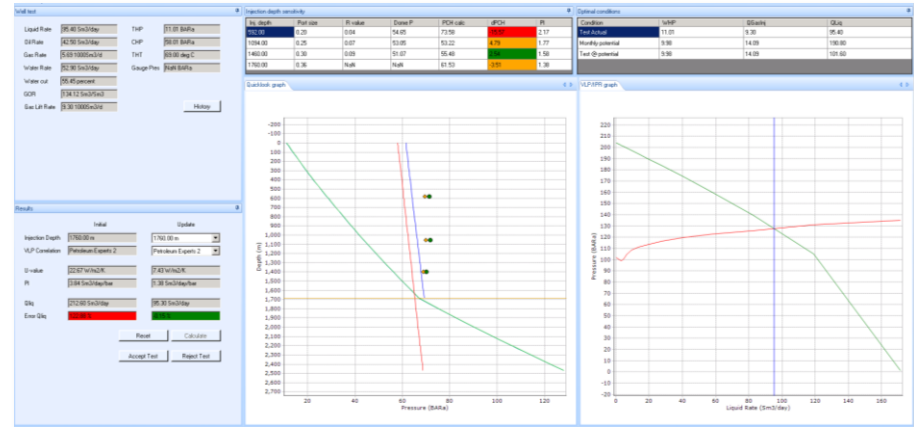
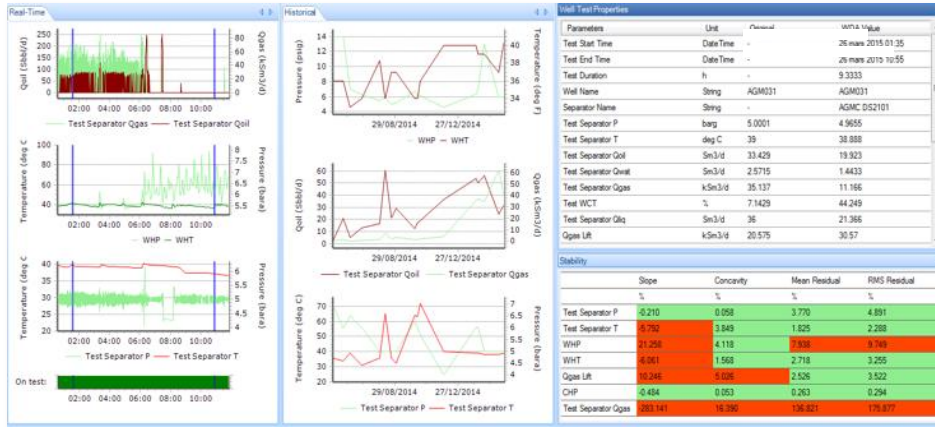


Case study: Well Test Validation

Validate well test data



Calibrate models



Case study: Operating Envelopes

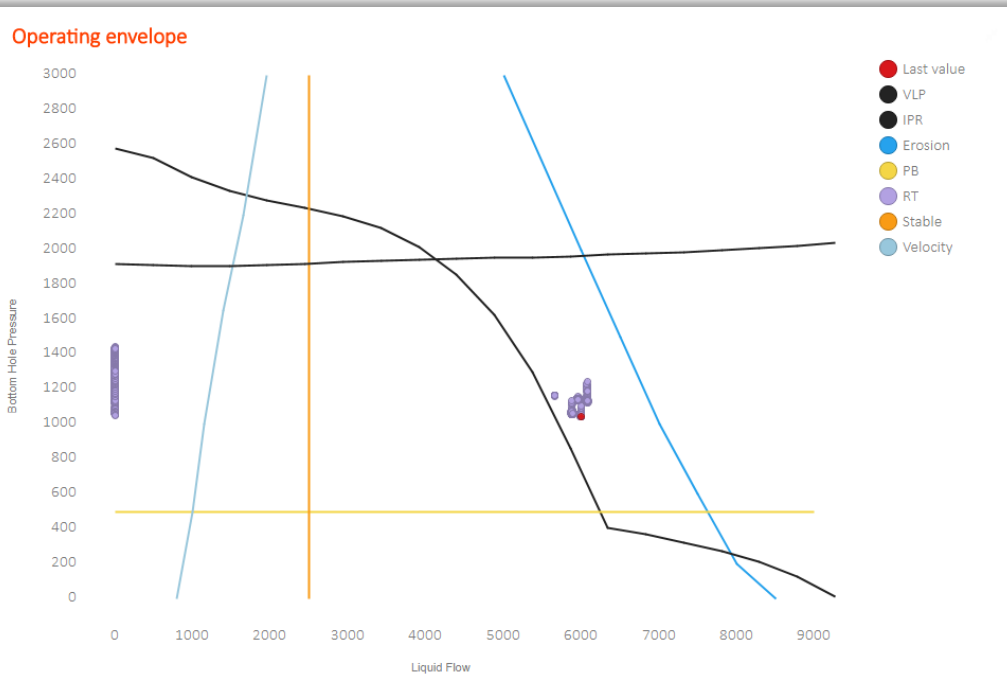
Limit calculation based on models



Cross-check with actual operating points



Raise alarms/events based on operating region

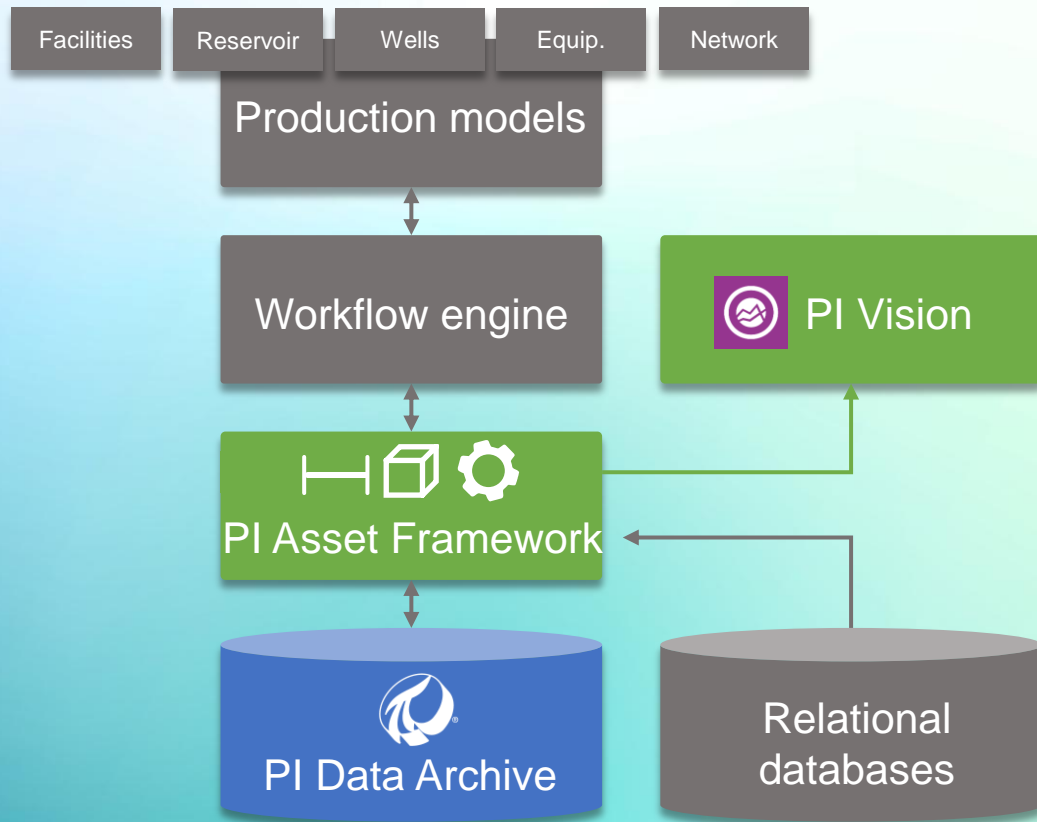


Issues and Shortcomings

- The variety of data has increased → difficult to integrate
- It does not scale well and requires heavy maintenance
 - Need for data structure
 - Need for context information
- Lack of common data model
 - Data silos
 - Difficult to share results
- It struggles with data cleansing and aggregation
- Difficult to exploit/read data for users

 Manage data centrally using Asset Framework

Enhance and scale with PI AF



Case study: Maintenance of a giant field

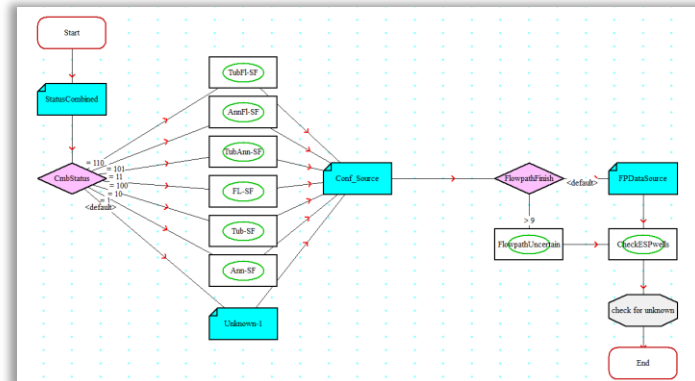
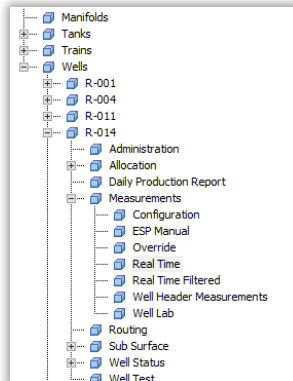
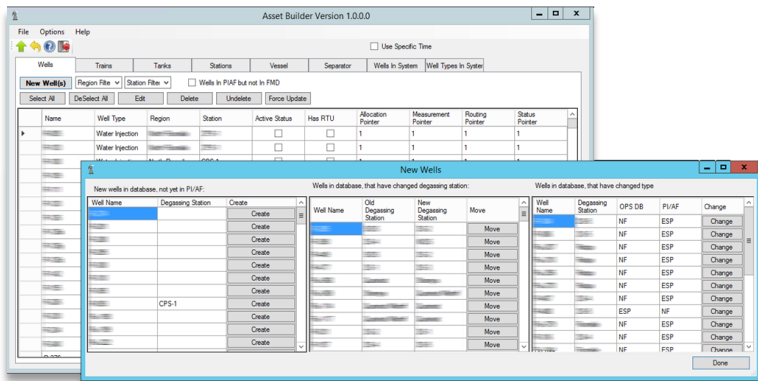
User-friendly
interface for adding
equipment



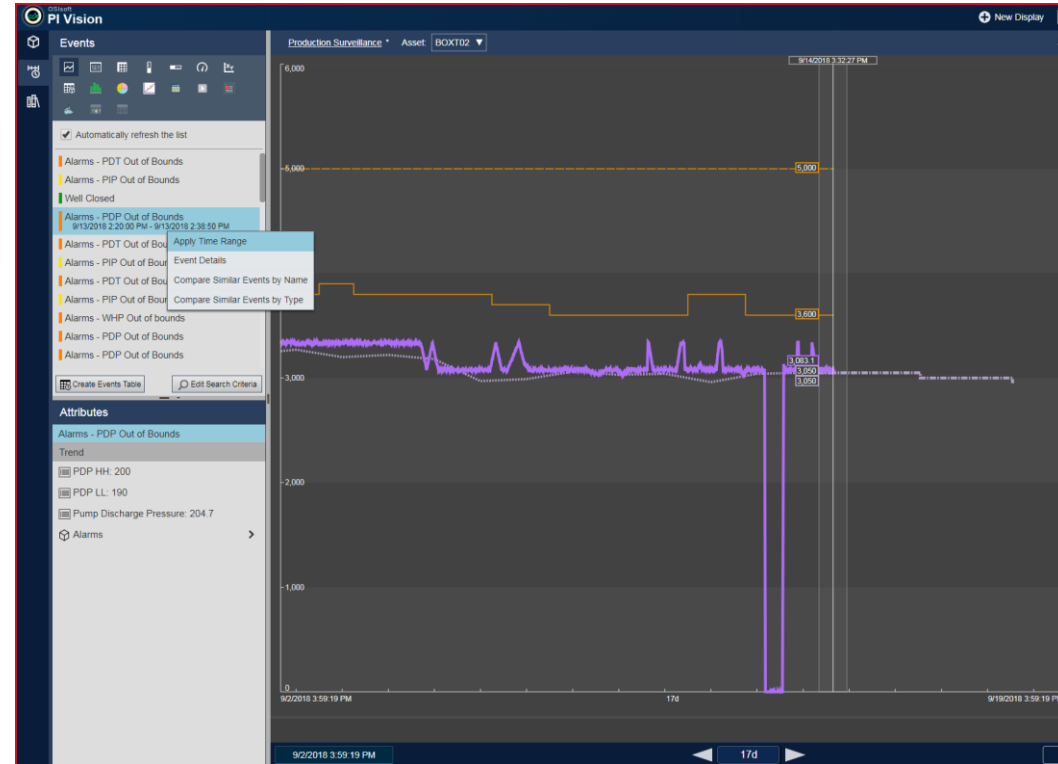
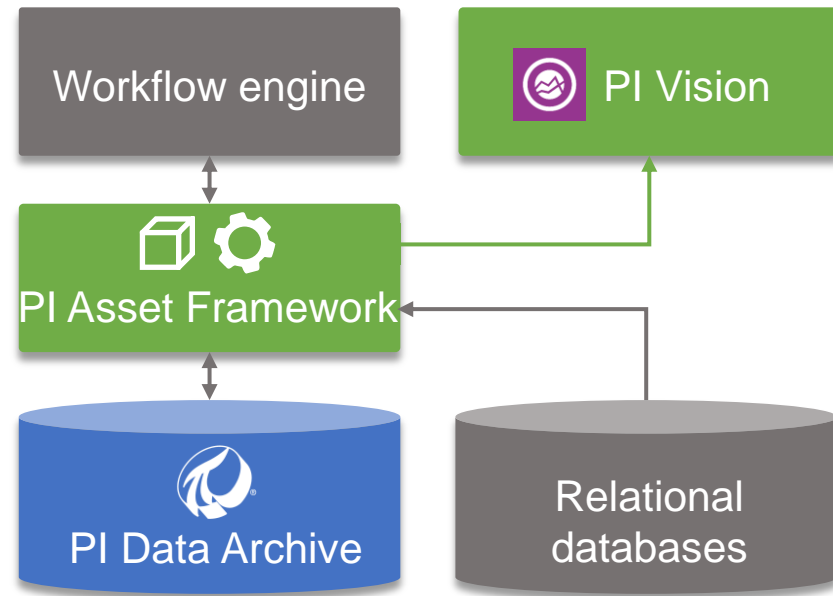
Auto update of AF
and connection to PI
tags



Auto update of
workflows and
models



Case study: Broad exposure to DOF results

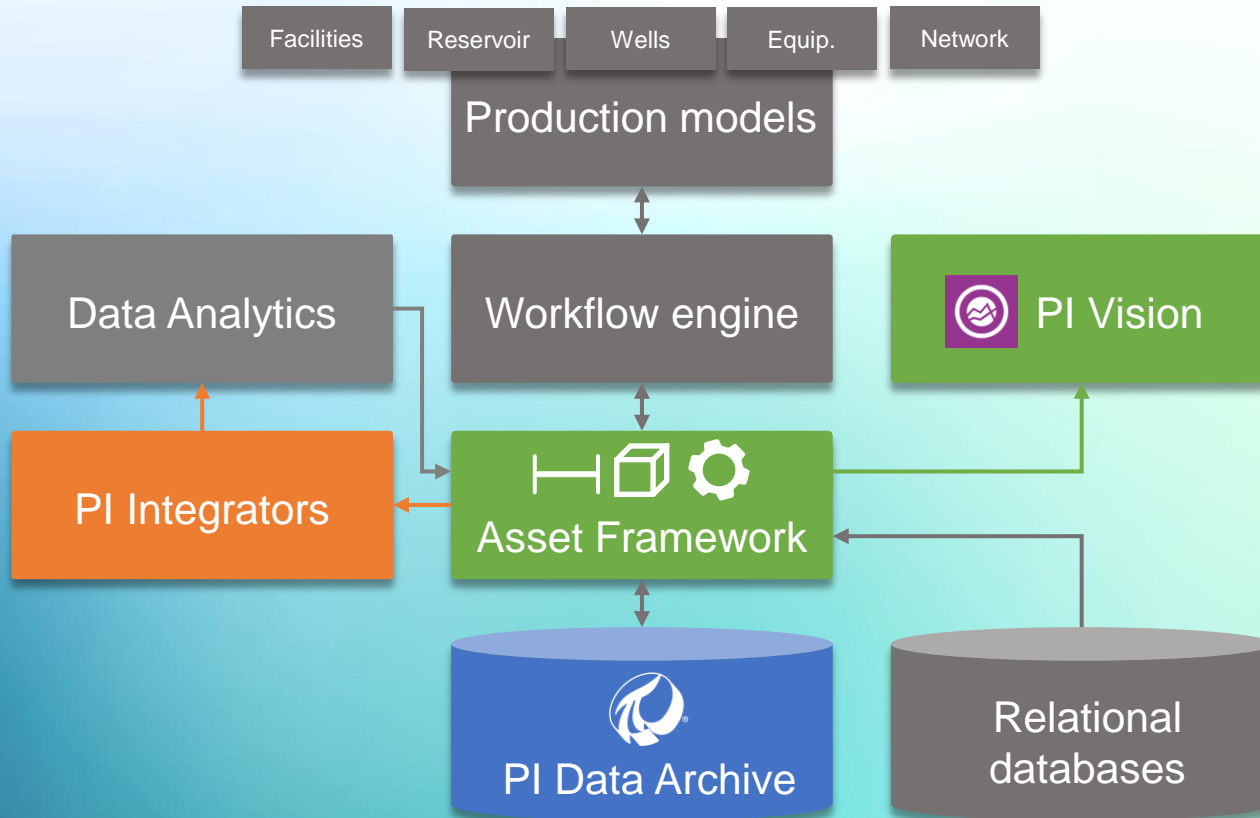


Shortcomings with « enhanced » way

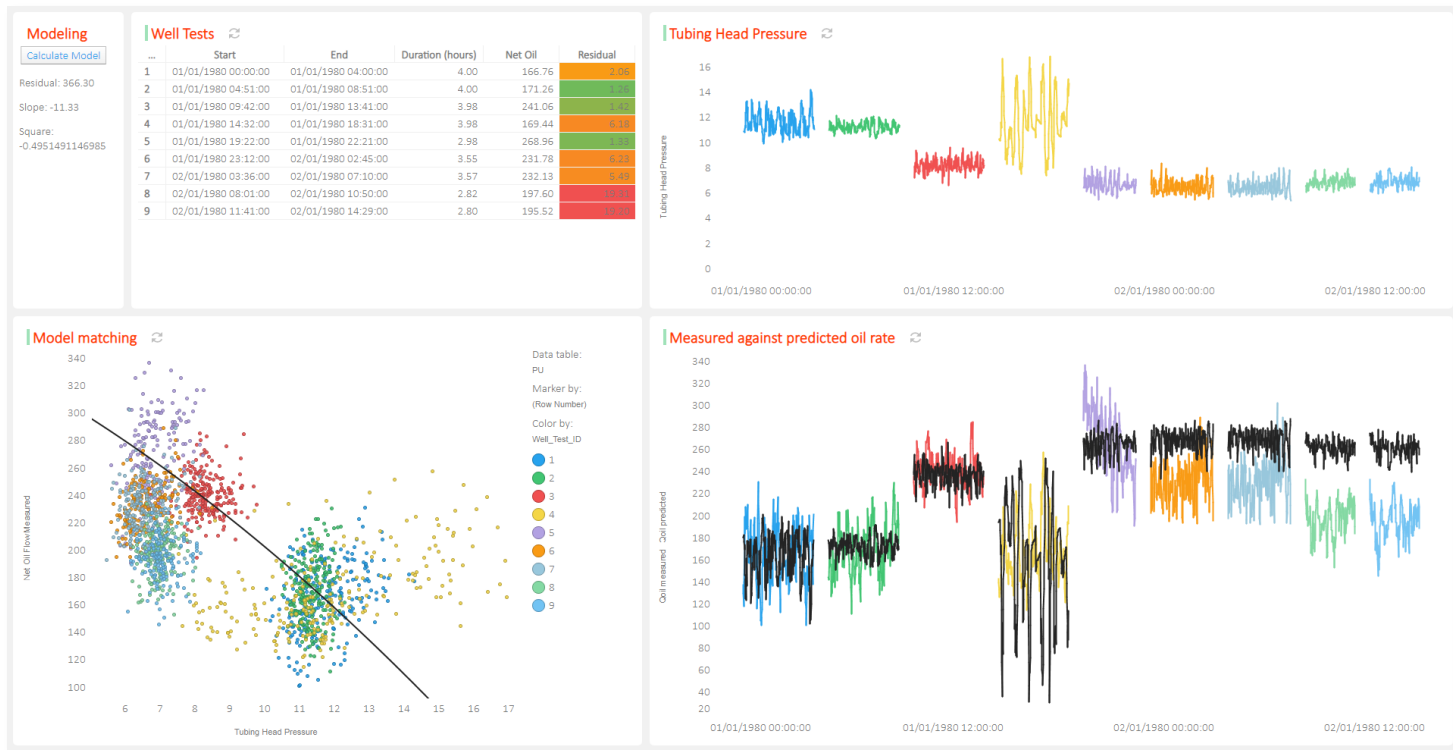
- Data Analytics are increasingly important
- DOF should embed both physical and statistical models

 Use PI Integrators

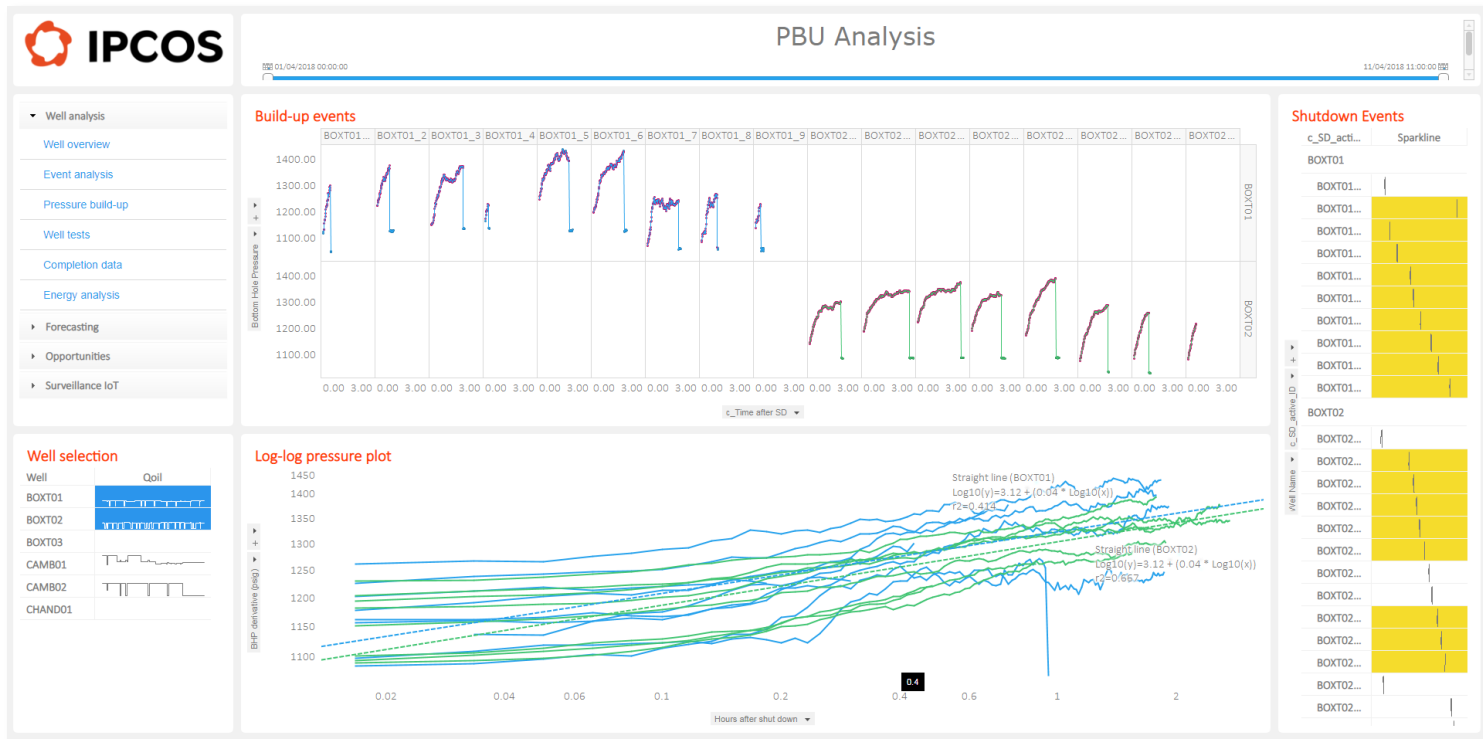
Exploit the power of data analytics



Case study: Data-driven virtual meter



Case study: Pressure build-up analysis

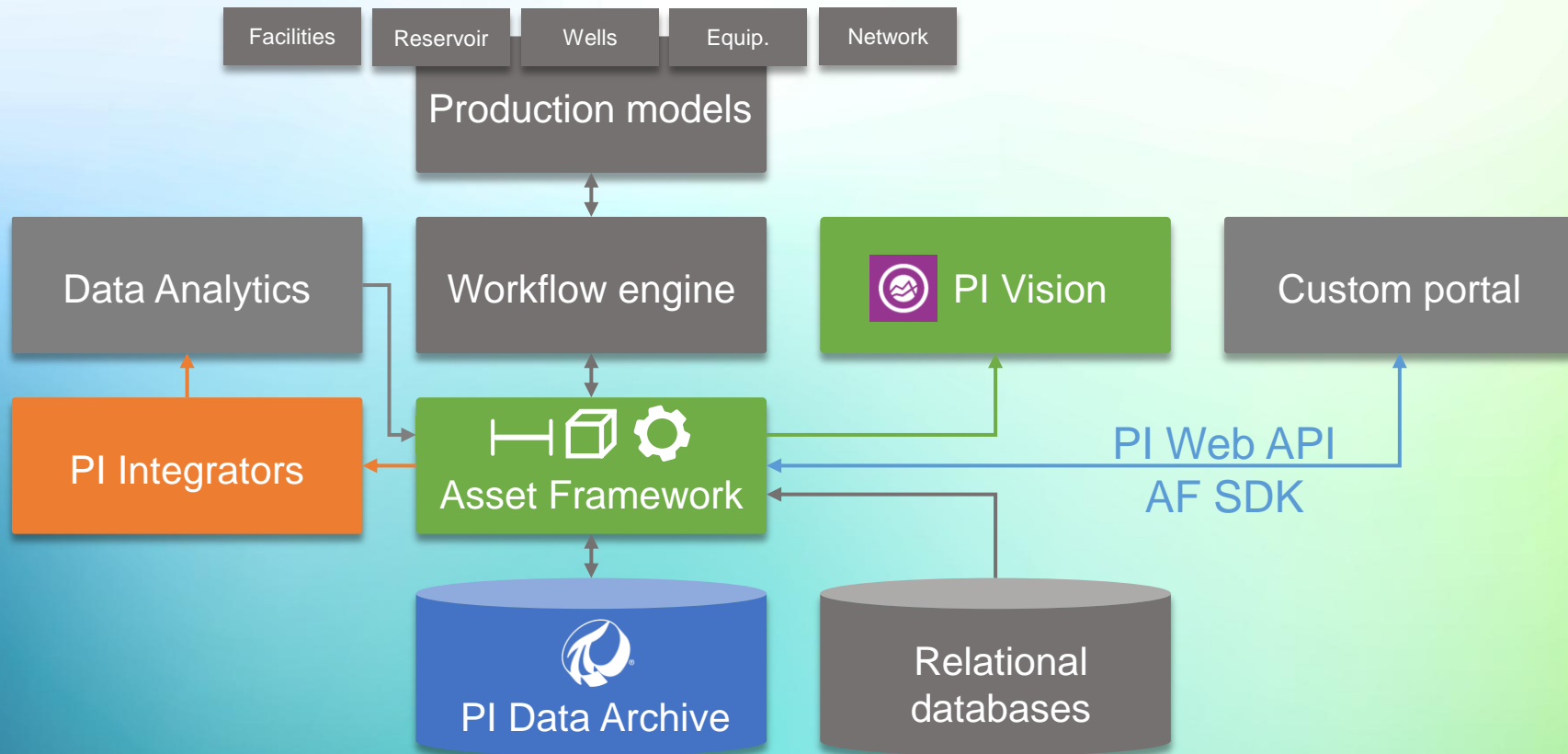


Still have shortcomings?

- Tools out-of-the-box may not answer all your requirements, or be fit for purpose
- Custom development is required, but cost, time, robustness and maintainability are a concern

 Use PI Developer Technologies

Ease Development - PI Developer Technologies



Case study: Exception-based surveillance

IPCOS My Actions Overview Deformation Facility Wells Well Test Events Flares KPI Search Assets Denis Gauder

My Unhandled Events

Field	Asset Type	Asset	Event Type	Priority	Start Time	End Time	Status	
<input type="checkbox"/>	Water Injector	16-170	Test Event	Error	06 Mar 2018		Open	DETAILS
<input type="checkbox"/>	Water Injector	16-170	Test Event	Error	05 Mar 2018	06 Mar 2018	Open	DETAILS
<input type="checkbox"/>	ESP	16-170	Test Event	Error	05 Mar 2018	05 Mar 2018	Open	DETAILS
<input type="checkbox"/>	ESP	16-170	Test Event	Error	05 Mar 2018	05 Mar 2018	Open	DETAILS
<input type="checkbox"/>	Water Injector	16-170	Test Event	Error	05 Mar 2018	05 Mar 2018	Open	DETAILS

[ACKNOWLEDGE & CLOSE](#)

My Assigned Actions

Field	Asset Type	Asset	Event Type	Priority	Start Time	End Time	Status	
<input type="checkbox"/>	ESP	16-170	Test Event	Error	06 Mar 2018		Open	DETAILS
<input type="checkbox"/>	ESP	16-170	Test Event	Error	05 Mar 2018	06 Mar 2018	Open	DETAILS
<input type="checkbox"/>	ESP	16-170	Test Event	Error	05 Mar 2018	05 Mar 2018	Open	DETAILS
<input type="checkbox"/>	ESP	16-170	Test Event	Error	28 Feb 2018	28 Feb 2018	Open	DETAILS

IPCOS My Actions Overview Deformation Facility Wells Well Test Events Flares KPI Search Assets Denis Gauder

Test Event

Assigned To PT B Block
Active Step Quality Event

Start Time 05 Mar 2018 00:24:26
Priority Error

End Time 05 Mar 2018 05:37:26
Description This rule triggers if the flowline pressure is higher than 50

Previous occurrences

Start Time	End Time	Duration
05 Mar 2018 00:24:26	05 Mar 2018 05:37:26	5h 13m
04 Mar 2018 12:24:56	04 Mar 2018 17:38:26	5h 13m
04 Mar 2018 00:23:26	04 Mar 2018 05:36:56	5h 13m

Previous steps

Step	Owner	Date
Quality Event	Kristof Berx	13 Aug 2018
Review event	Denis Gauder	05 Mar 2018

Comments & analysis

Kristof Berx, 13 Aug 2018
Instrumentation problem. Please trigger an on-site inspection.

Denis Gauder, 13 Aug 2018
I am unable to interpret the event - escalated to block A PT team

Start Date 03/04/2018 11:24 PM
End Date 03/05/2018 06:37 AM

Signals
CASINO_PRESSURE X TUBING_PRESSURE X

Injectors

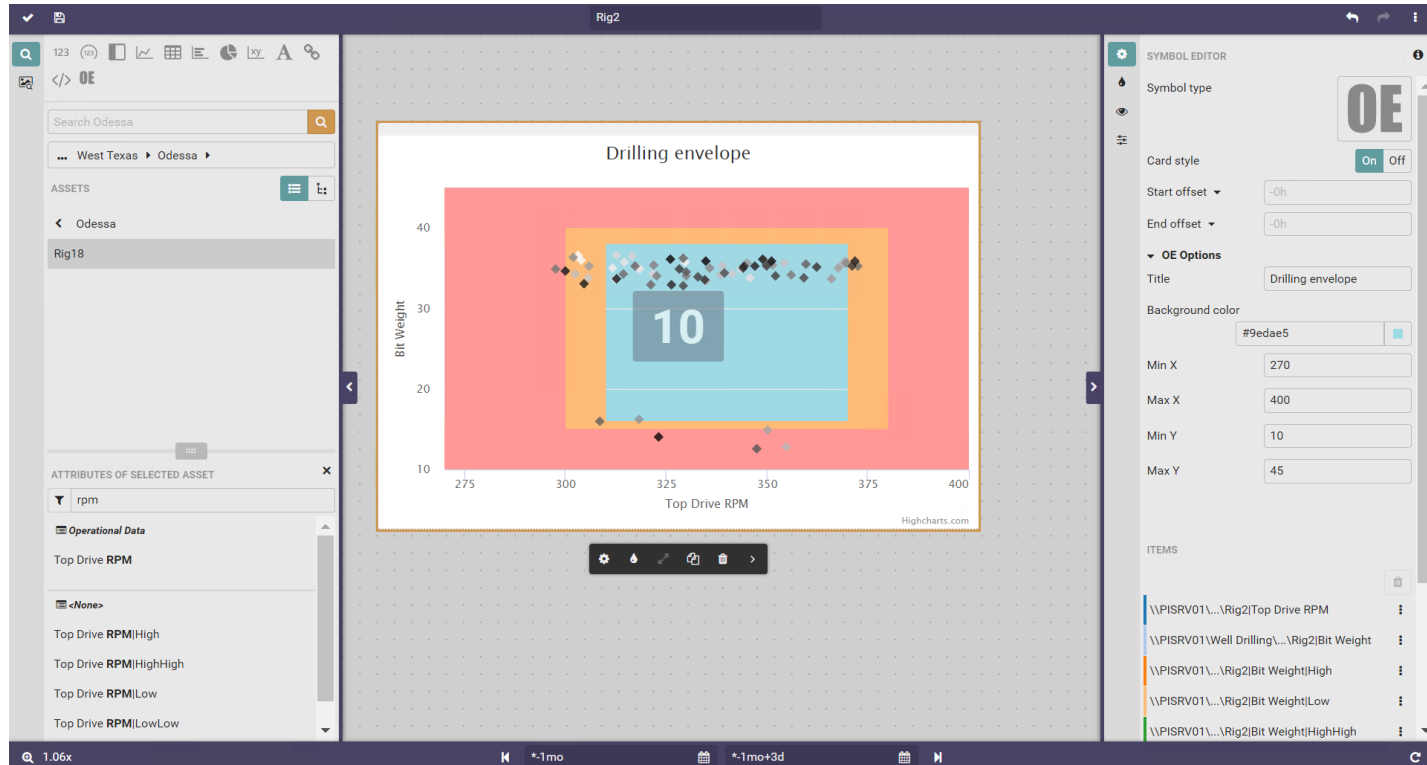
Well Info

Well Type ESP
Field 16-170
Block A
Reservoir 16-170
Completion Date 20 May 2003
Spud Date 02 Feb 2003
THP 54.4 psi
CHP 12.21 psi
Intake Press. 96.93 psi
PDP 1010.27 psi

Producer

Injectors

Case study: Operating envelopes



Conclusion

- The PI System suite can be integrated easily with the Digital Oilfield
- Using advanced components of the PI System suite can deliver state-of-the-art DOF
 - AF as the common data model for all DOF applications
 - PI Vision as the common visualization layer
 - PI Integrators for exploiting data analytics
 - PI Developer technologies for custom applications

Questions?

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the **microphone**

State your
name & company



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A smartphone displaying the PIWorld app interface, which features the OSIsoft logo and the text 'PIWorld'.

THANK YOU

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DZIĘKUJĘ CI NGIYABONGA TEŞEKKÜR EDERIM GRACIES
OBRIGADO شڪرا
DANKON TANK TAPADH LEAT SALAMAT
DANKIE TERIMA KASIH
KÖSZÖNÖM
СПАСИБО
PAKMET CIZGE
GO RAIBH MAITH AGAT
БЛАГОДАРЯ GRACIAS
ТИ БЛАГОДАРАМ
MAHADSANID
TAK DANKE
RAHMAT MERCI
HATUR NUHUN
CẢM ƠN BẠN
WAZVIITA
FALEMINDERIT
DANK JE ΕΥΧΑΡΙΣΤΩ GRATIAS TIBI
AČIŲ SALAMAT MAHALO IĀ 'OE TAKK SKALDU HA
GRAZZI PAKKA PĒR PAXMAT CAĞA
SIPAS JI WERE TERIMA KASIH
UA TSAUG RAU KOJ
ТИ БЛАГОДАРАМ
СИПОС
MULTUMESC
FAAFETAİ
ESKERRIK ASKO
HVALA ХВАЛА ВАМ
TEŞEKKÜR EDERIM
HVALA
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ĎAKUJEM
MATUR NUWUN