The Production Data Singularity

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Digital Energy – 3rd Production Data Reporting and Analytics

Stavanger, May 2015

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Agenda

- The Production Data Singularity
- Value-Added?
- Solution Components
- Component Example (MPRML)
- Summary

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“Your mind is for having ideas, not holding them.“

- David Allen

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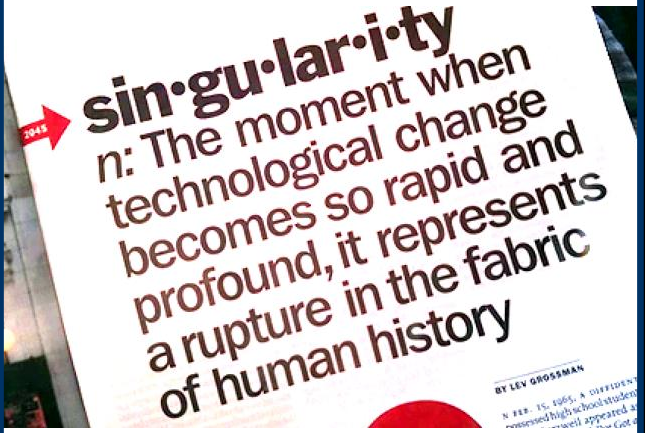
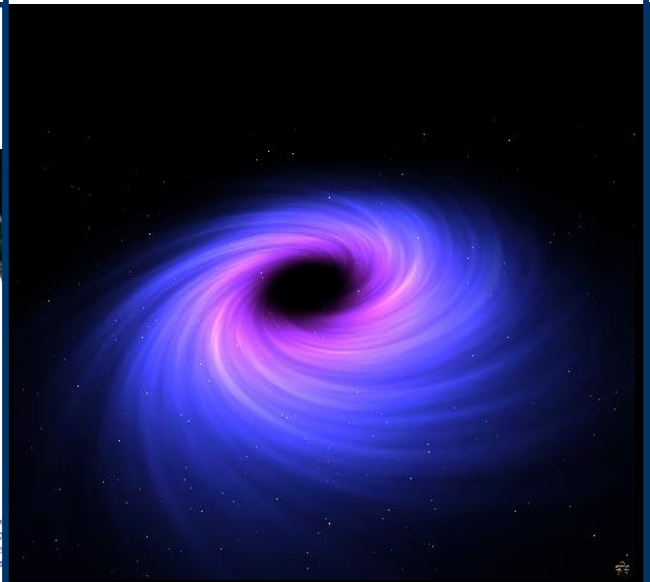
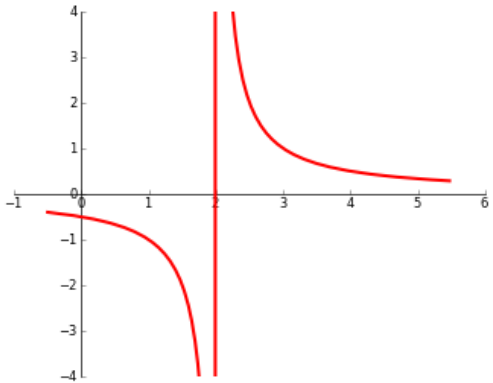
Production Data Singularity

Momentum	Visibility	Paradigm
		

The Evolution of Digital Upstream Technology

Digital Oilfield (DOF)

- IT-focus
- Measurement acquisition
- Data delivery
- Cost, time efficiency
- Realtime conditions

+

Integrated Operations (IO)
DOF features *plus*

- Increased operations-focus
- Collaboration
- Process / workflow efficiency
- Visualization / KPI delivery
- Explicit bbl or EOR objectives
- Data standards

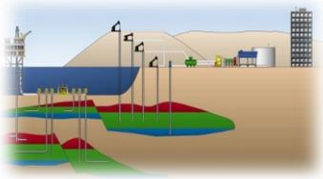
+

Asset Optimization (AO)
IO features *plus*

- Increased engineering-focus
- Holistic, full lifecycle perspective
- Online, integrated models
- Transient-event solutions
- Unifying software technology

Digital Communication

Collaborative Environments



Single System Intelligence

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What is the impact?

- Data sources
- Data types
- Data frequency
- Models
- Workflows
- Visualization
- Integration
- New requirements
- ….

Volume

- Gigabytes to Terabytes to Petabytes…

Velocity

- Real-time, high frequency, streaming…

Variety

- Numbers, text, links, images, video…

Veracity

- Quality, trustworthiness…

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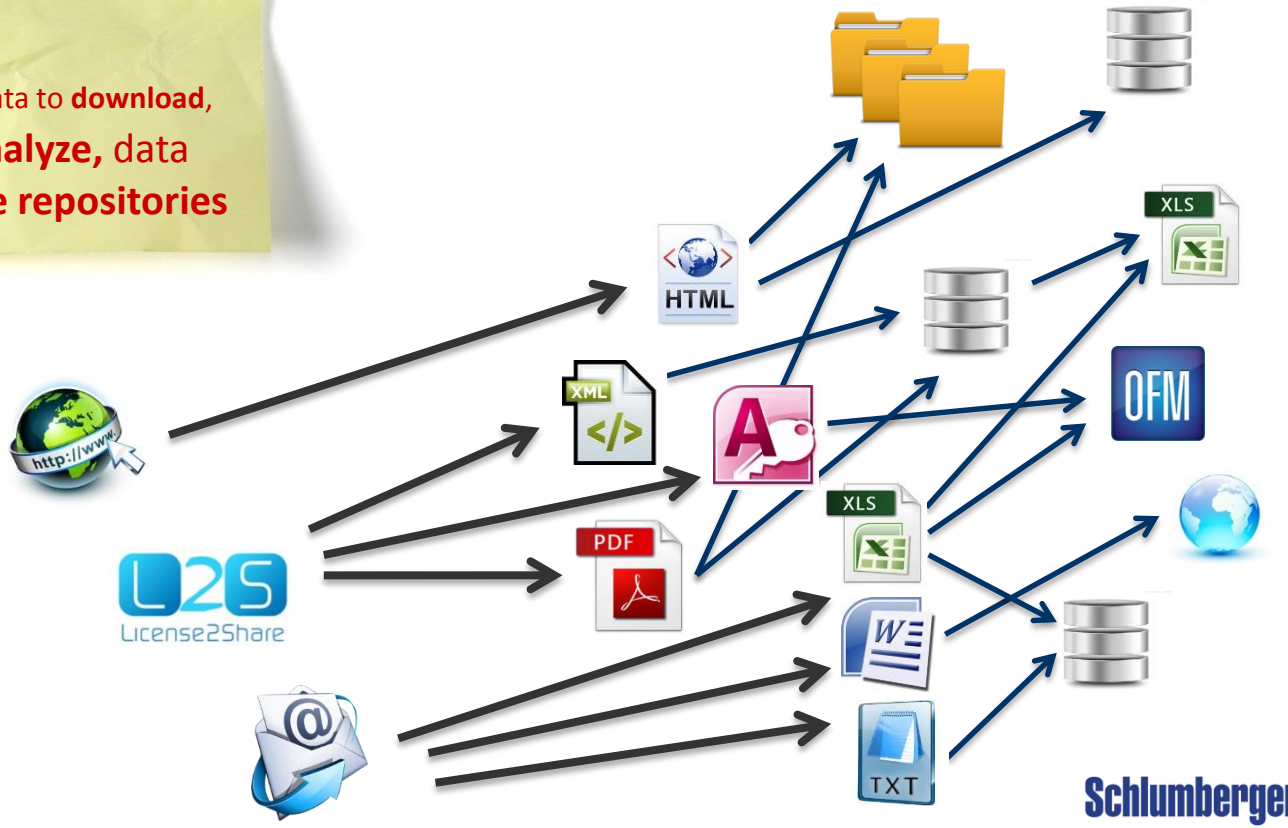
Challenge #1

Increasing **volume** of data to **download**, **collect, process** and **analyze,** data stored in **different file repositories**



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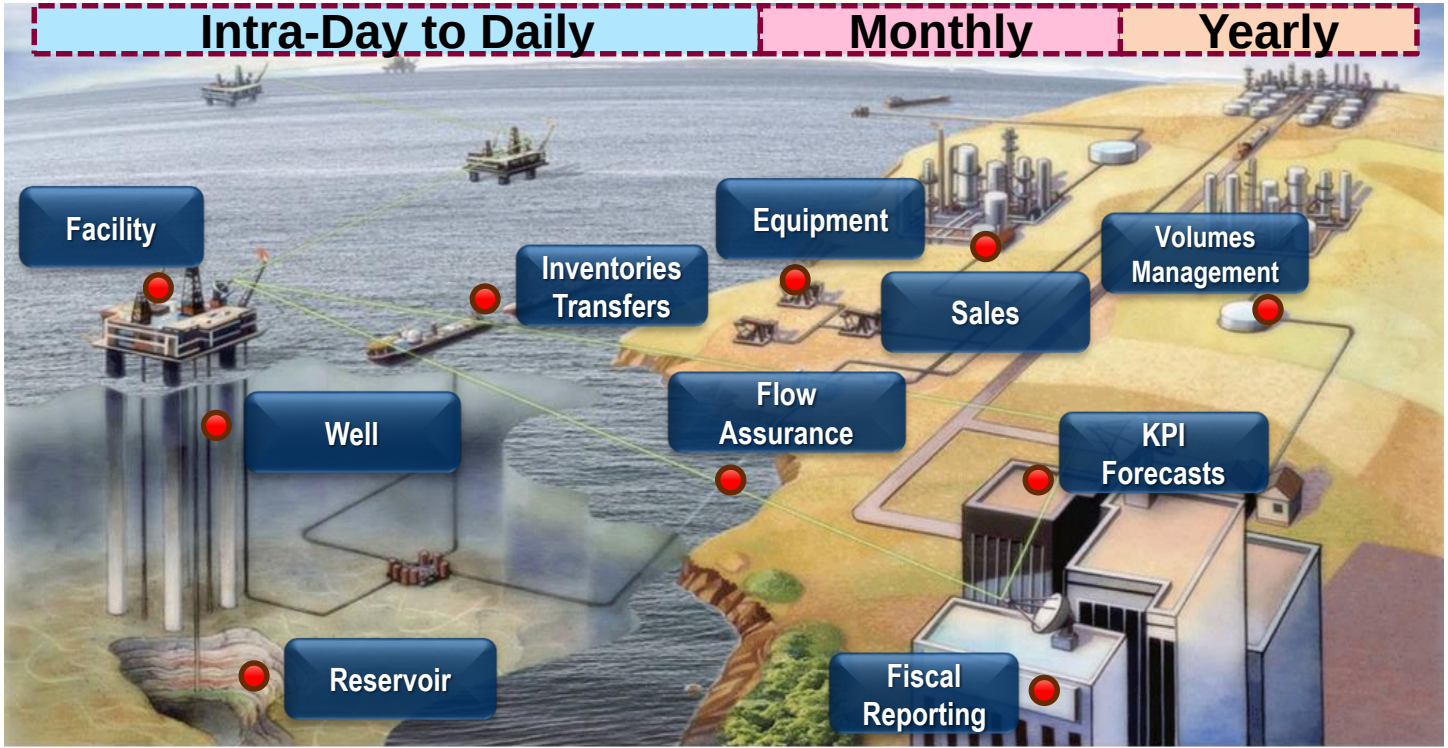
Challenge #2

Multiple **time** , **data types**

calculations and **aggregation levels**



Challenge #3

The need of **reliable** and **auditable** **production data** and results

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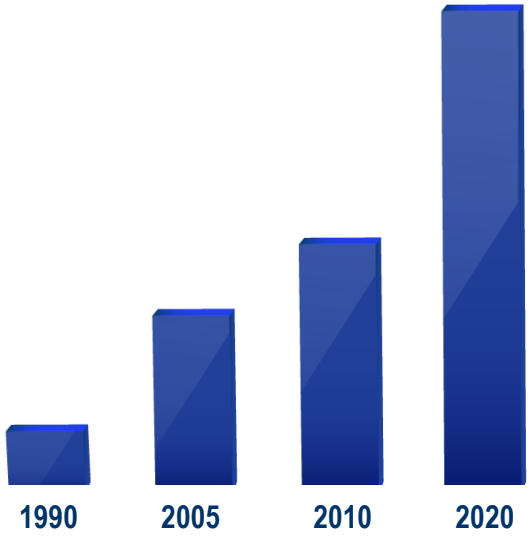
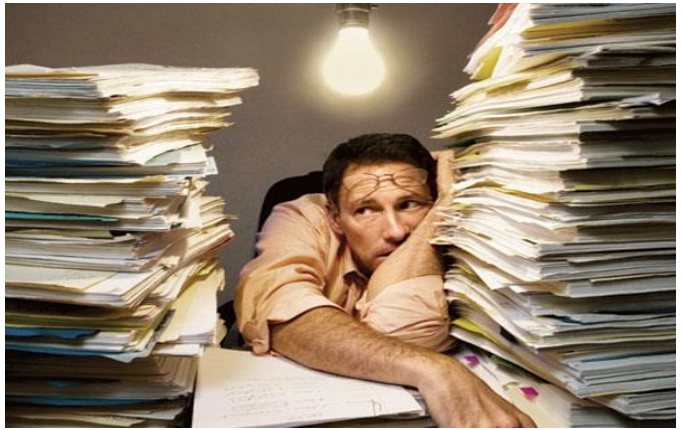
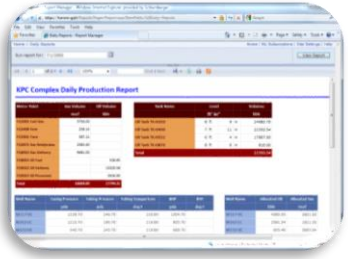
E.g. Wells per Engineer





Challenge #4

A lot of **manual operations**,
high dependency on individuals,
no **traceable changes**



Challenge #5

The need to **integrate**, **share,** and **distribute** the data **securely**

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Challenge #6

The need of increased awareness of the Asset's **Performance …** graphically

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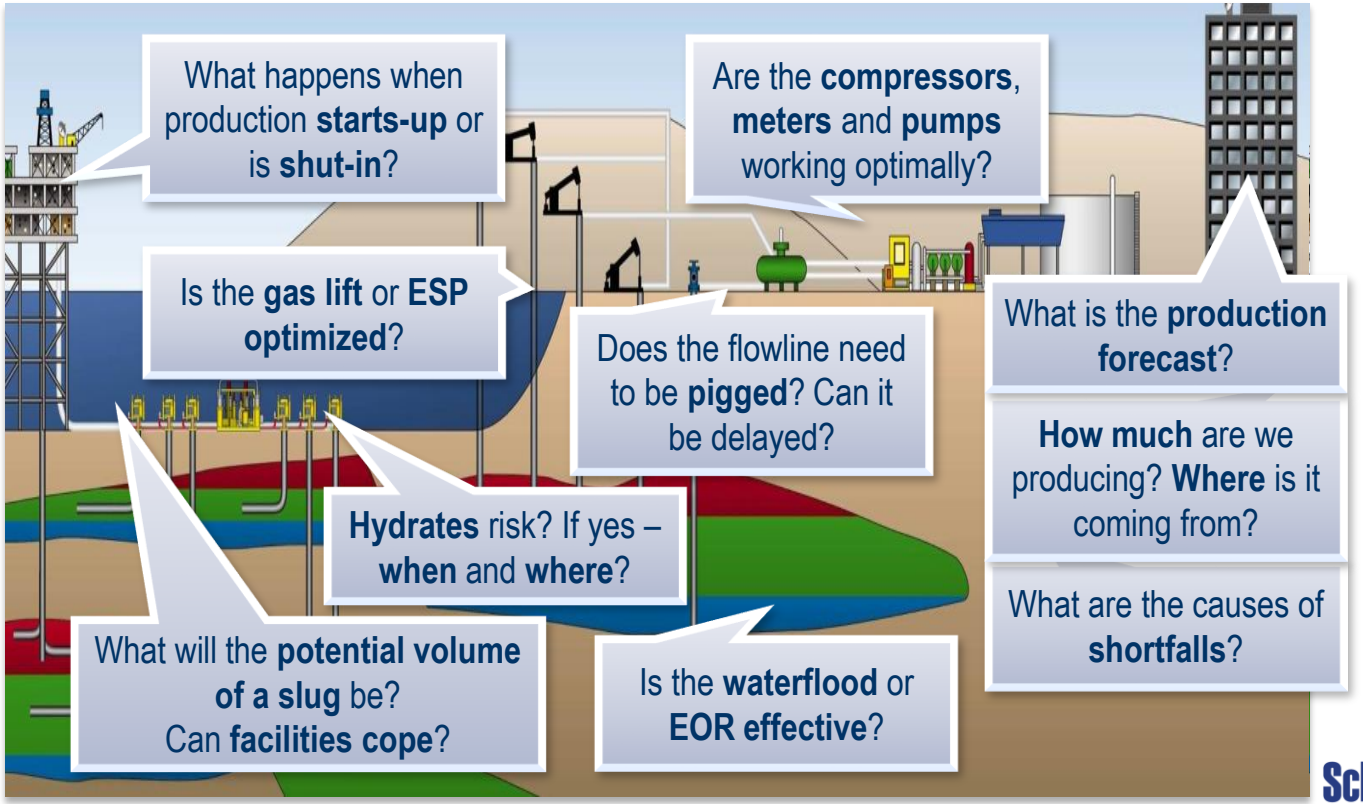
And… how is the operator doing?



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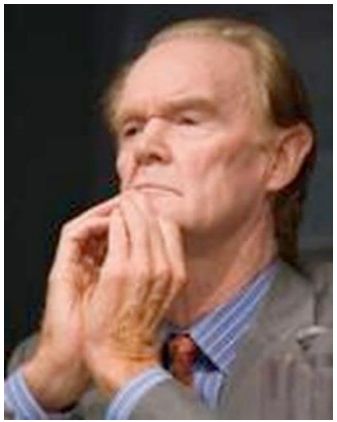
What if we could see what we
need to see… in time to respond?

“Value has a value only if its value is valued.“

- Bryan Dyson



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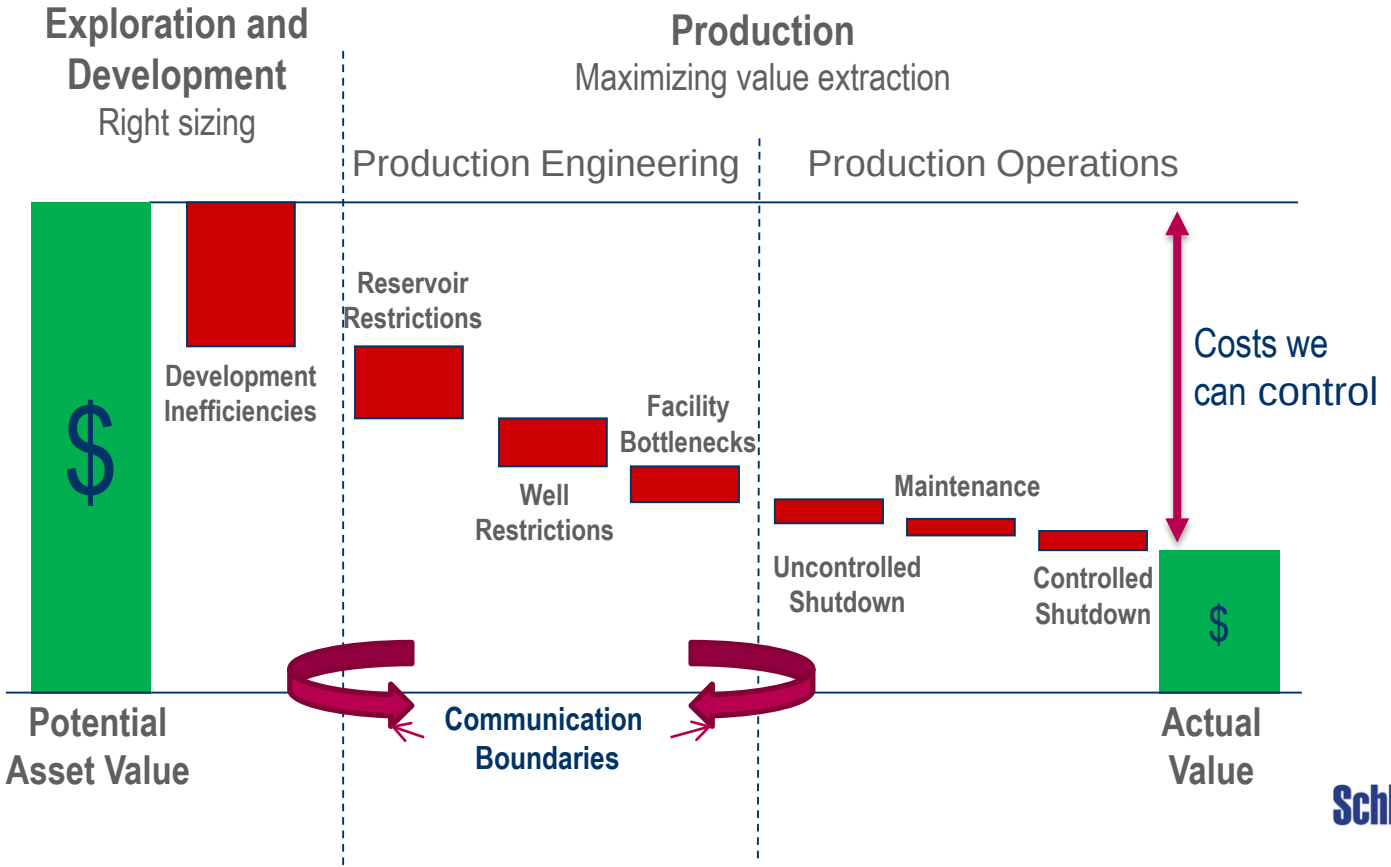
Potential vs Realized Value



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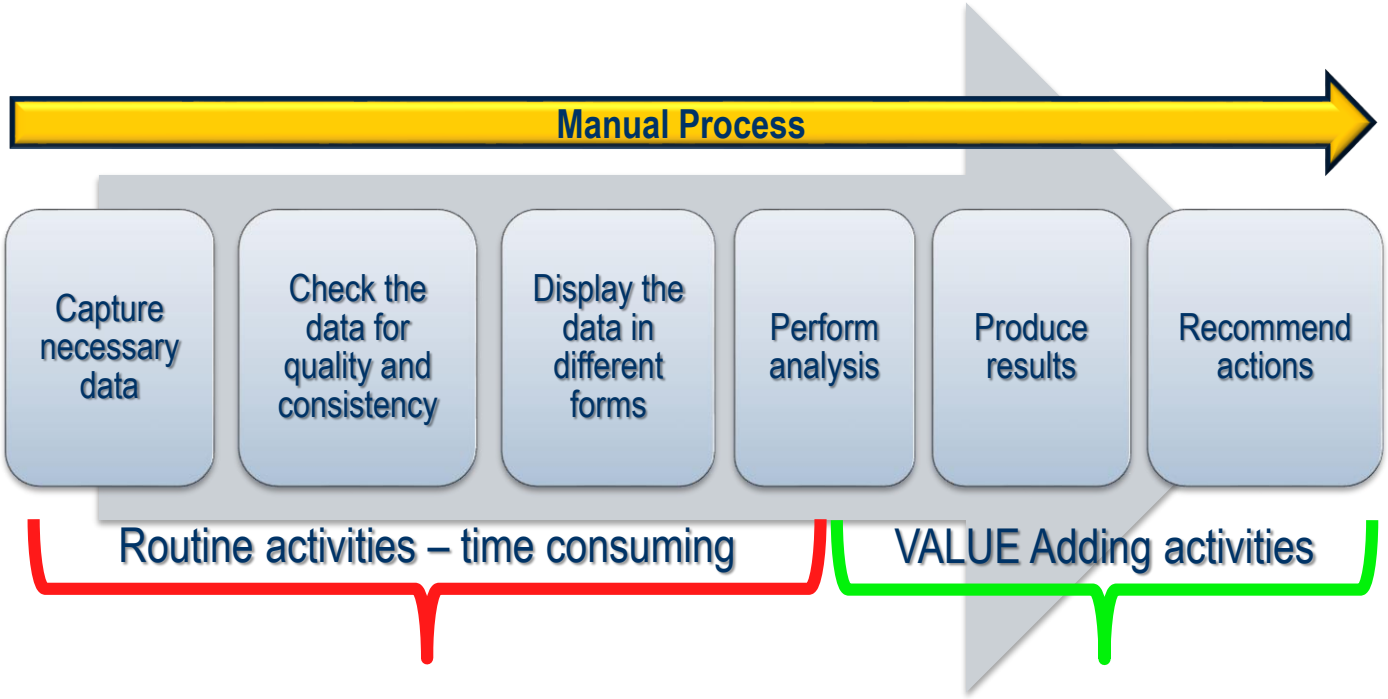
Typical production performance control workflow



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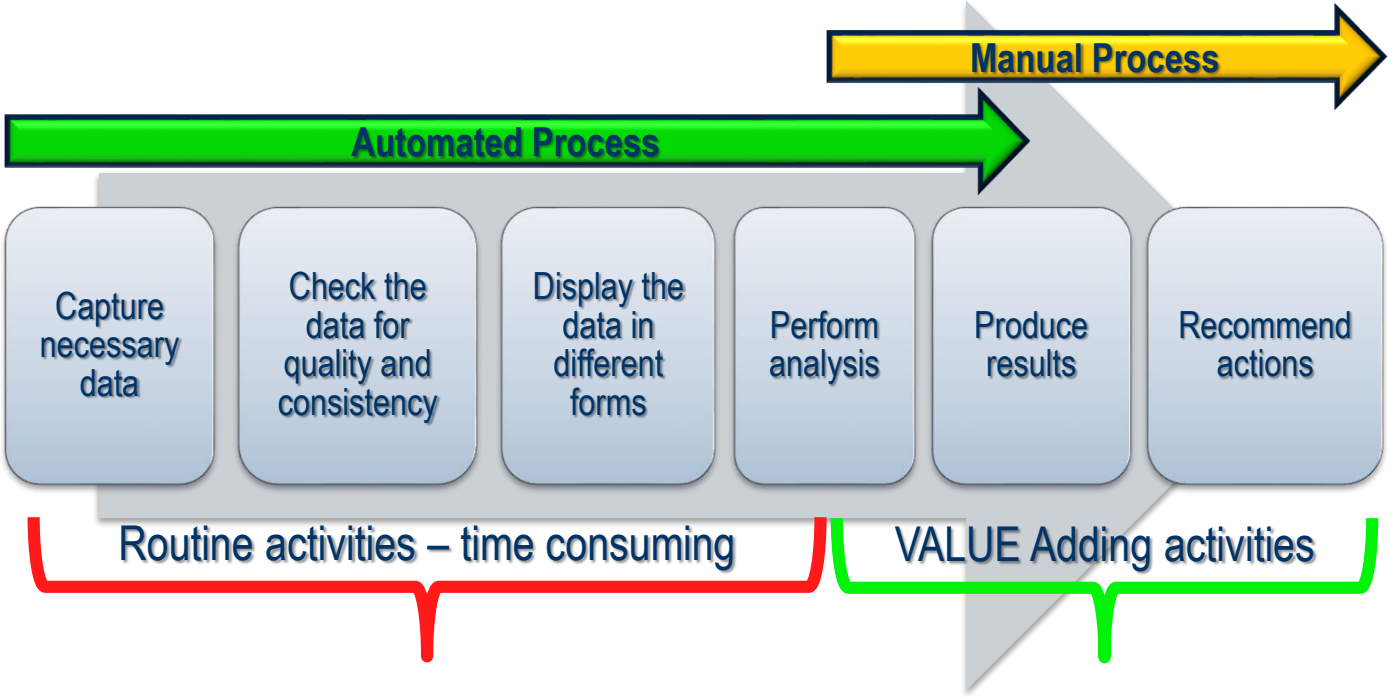
Improved production performance workflow



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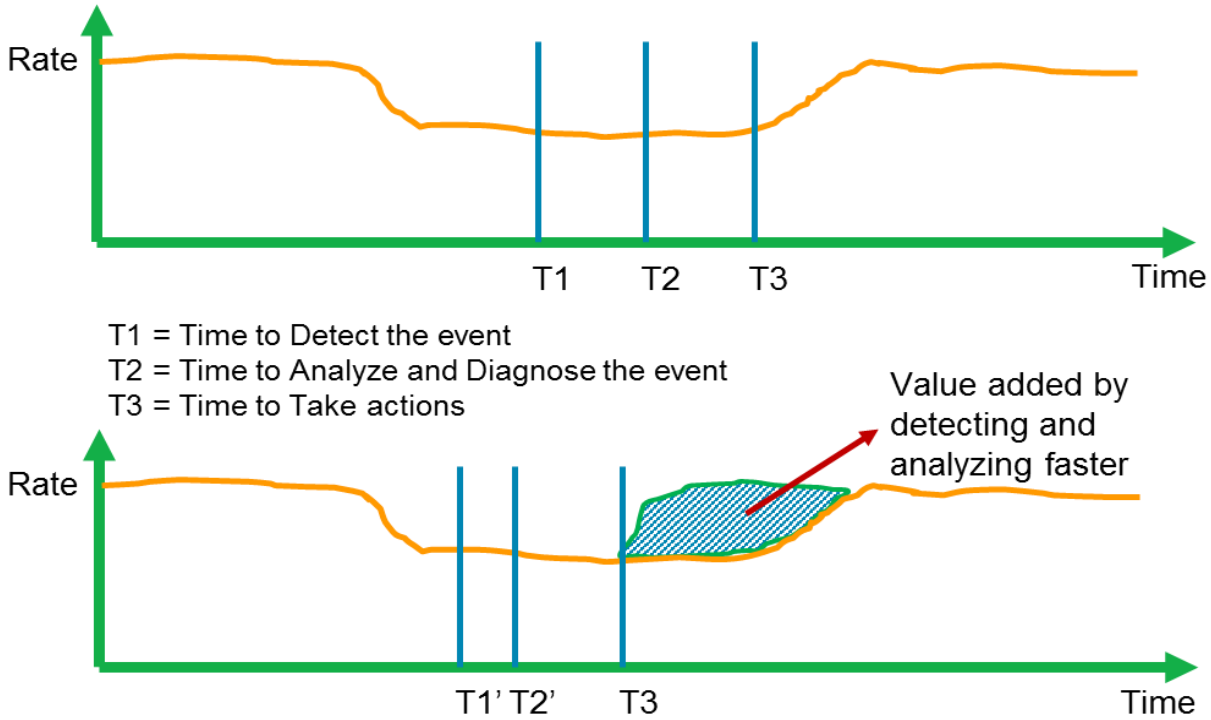
Added value



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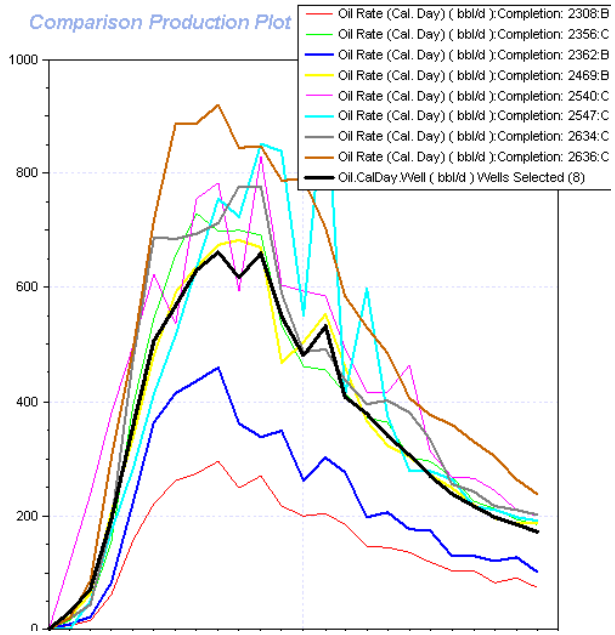
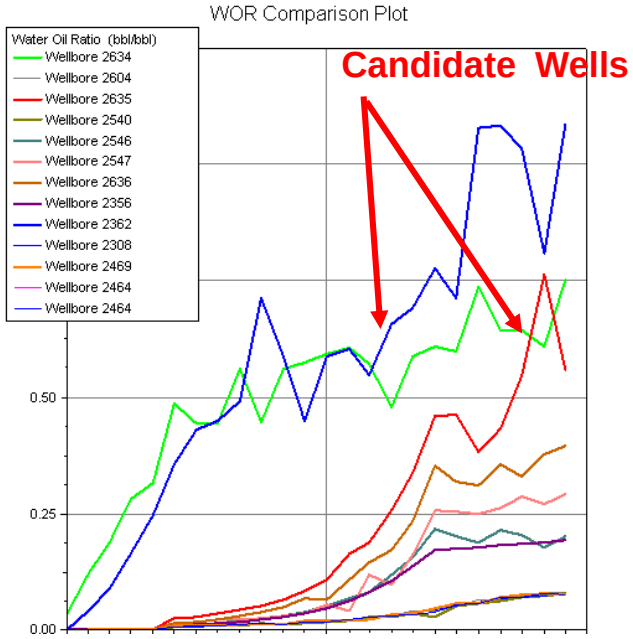
Performance Comparison





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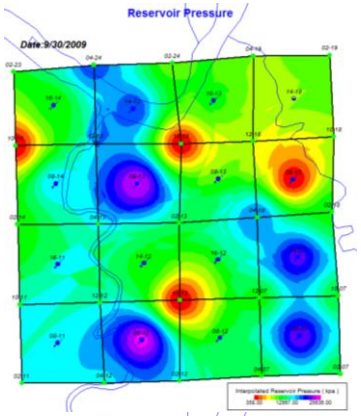
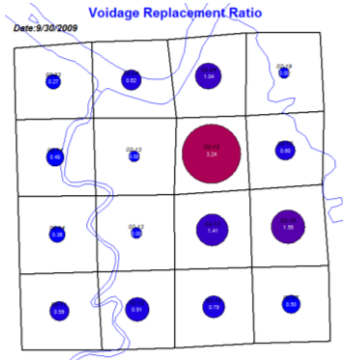
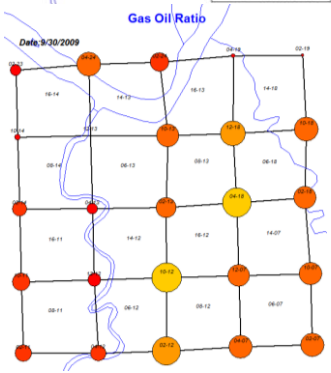
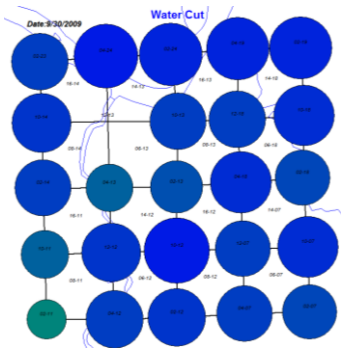
Compare KPIs

- Mapping KPI's
  - Identify regions of:
    - High GOR
    - Low water cut
    - Unbalanced VRR
    - Low Recovery Factor









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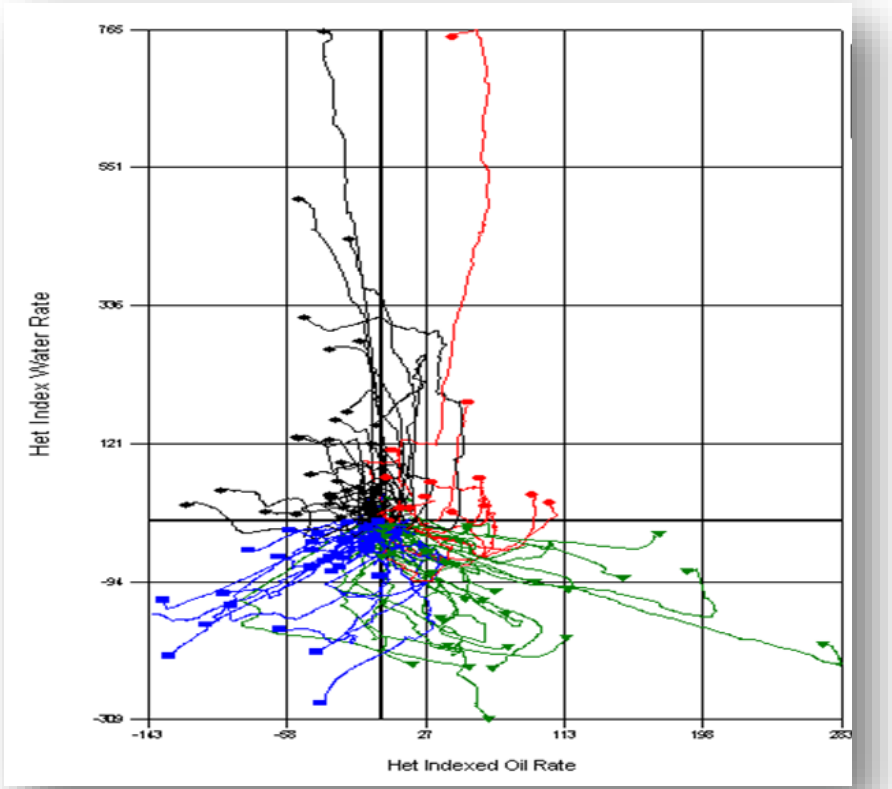
Advanced Analysis



- Identify good wells at a glance
- Interpret wells that need attention
- Identify over-injected or under-injected wells
- Understand the behavior of wells over its history

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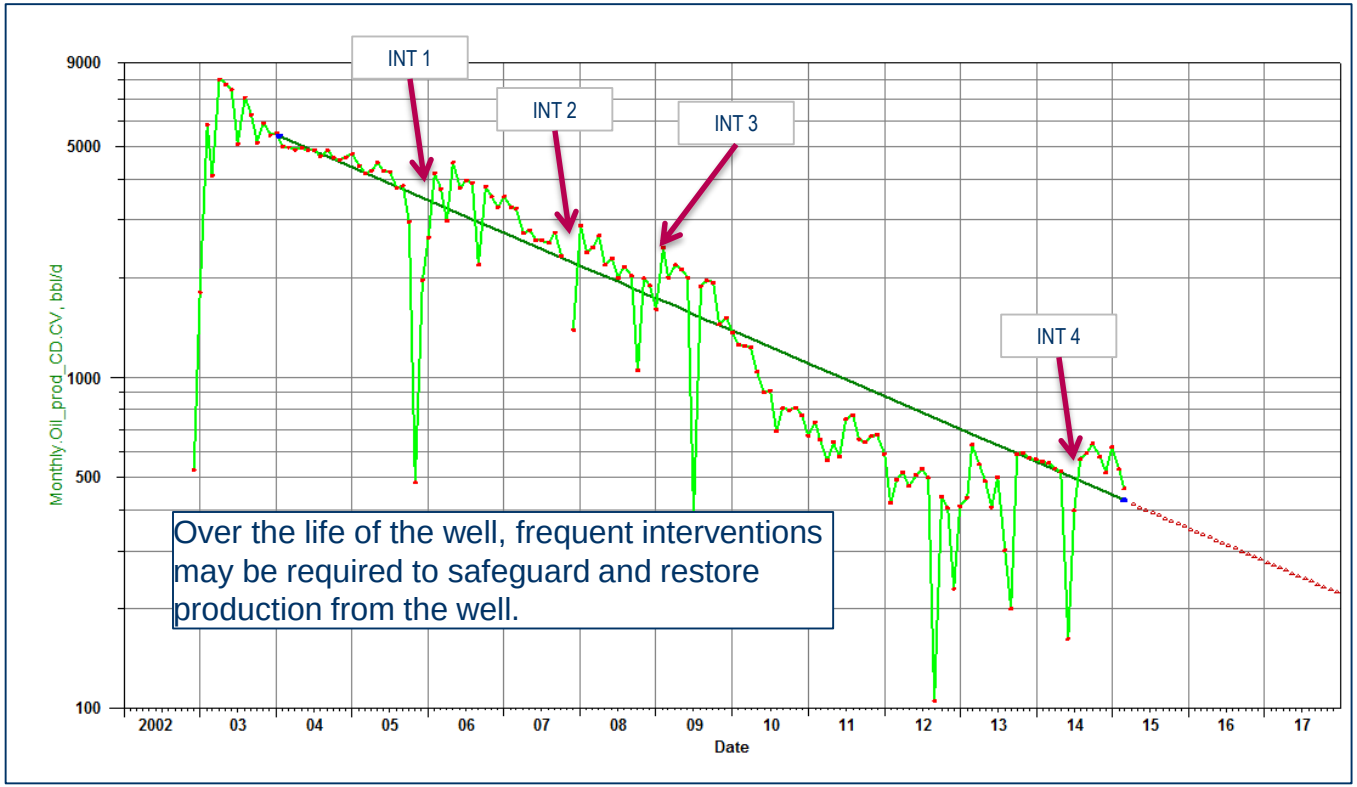
Life of Well Interventions – Evaluation and Gains (or Losses) Tracking



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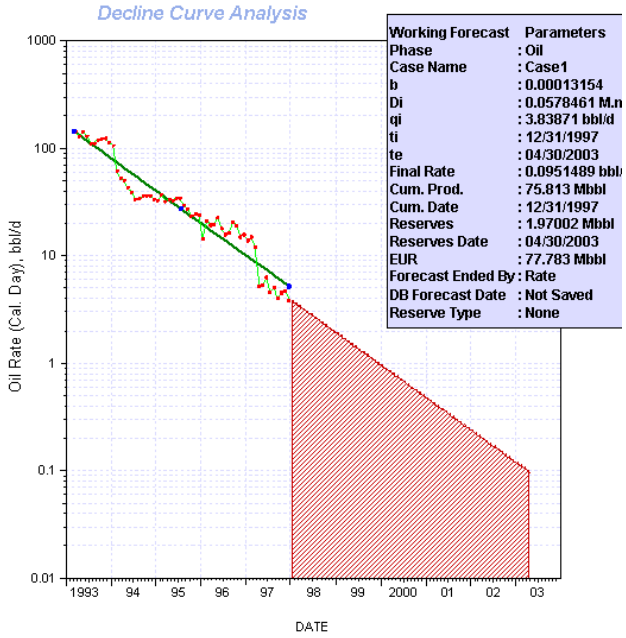
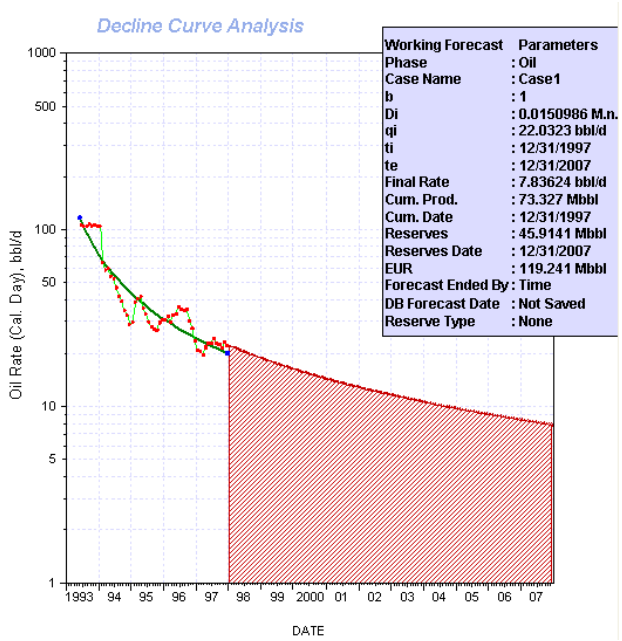
Perform DCA – Production Forecasting





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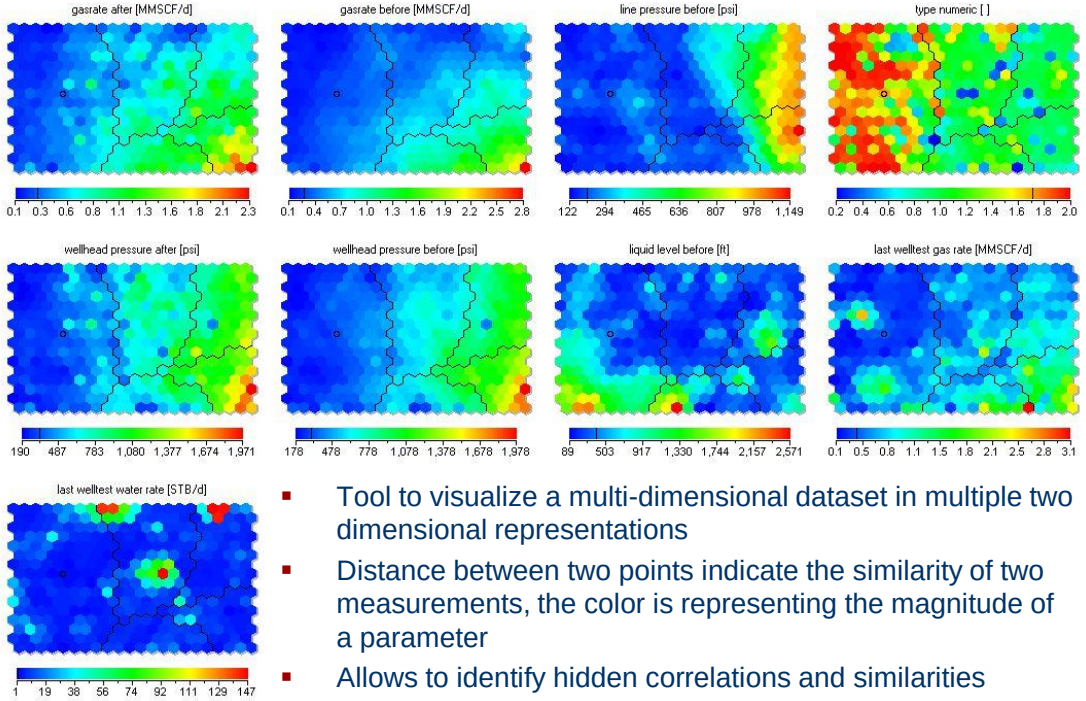
Self-Organizing Map – Candidate Selection



- Tool to visualize a multi-dimensional dataset in multiple two dimensional representations
- Distance between two points indicate the similarity of two measurements, the color is representing the magnitude of a parameter
- Allows to identify hidden correlations and similarities

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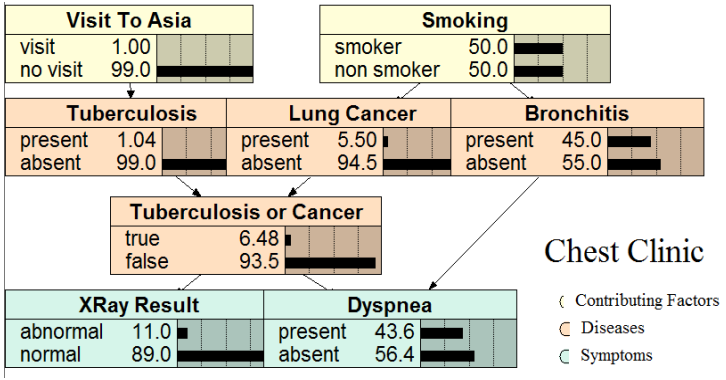
Predictive Diagnostics



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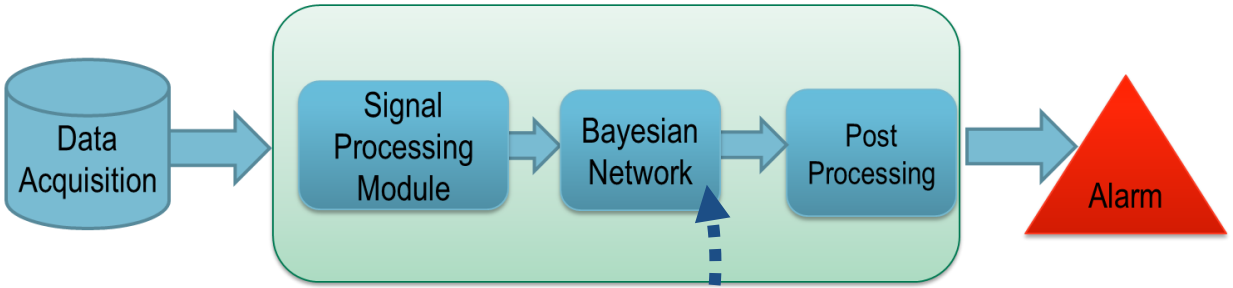
Predictive Diagnostics – ESP Surveillance



Symptom											Most Probable Cause			Severity	Example	Comments
Amps	Volts	Hertz	WHT	WHP-T	Pi	Pd	Pd-Pi	Ti	Tm	WHP-A	Name	Code	Description			
↓↓	0	0	↓	↓	↑	↑↓	↑↓	↑	↑↓	0	Deadhead	DH1	Restriction above the ESP (Up-stream of flowline pressure indicator where WHP data available)	Major	Figure 7 and Figure 8	Deadheads are any restriction above the ESP. Where tubing wellhead pressure is available, one can differentiate between a restriction in the tubing and at the wellhead only if WHP data is available. Where WHP is not available, then the alarm is classified as DH1DH1 code is used as
↓↓	0	0	↓	↓↓	↑	↑↓	↑↓	↑	↑↓	0	Deadhead	DH2	Restriction above the ESP (Down-stream of flowline pressure indicator)	Major	Figure 9 and Figure 10	The key and only difference between DH1 and DH2 is wellhead pressure which is the parameter that allows monitoring to differentiate between a restriction in the tubing (e.g. closed subsurface safety valve or deposits in tubing) and at the wellhead, hence the value of having wellhead pressure.
↓	0	0	↓	↑	↑	↑	↑	↑	↑	0	Deadhead	DH3	Partial Restriction above the ESP	Major	Figure 11	The symptoms are qualitatively the same as DH2, however it is the speed of change and magnitude which differ. There will be cases where a surveillance engineer may confuse the two. The two parameters which allow differentiation are [illegible] current where the change is slower as shown by the example. On some wells where reservoir pressure and PVT are well understood, it may be possible to calculate the absolute Pd for deadhead and thereby know when ESP is in DH3 versus DH2/DH1. In the example in Figure 11, the valve was closed downstream of a long subsea flowline and the time delay is due to the storage effects in the completion and subsea flowline.

10 years of Artificial Lift learning

SPE International

SPE 134702 & 164497

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“If you fail to plan, you are planning to fail!“

- Benjamin Franklin

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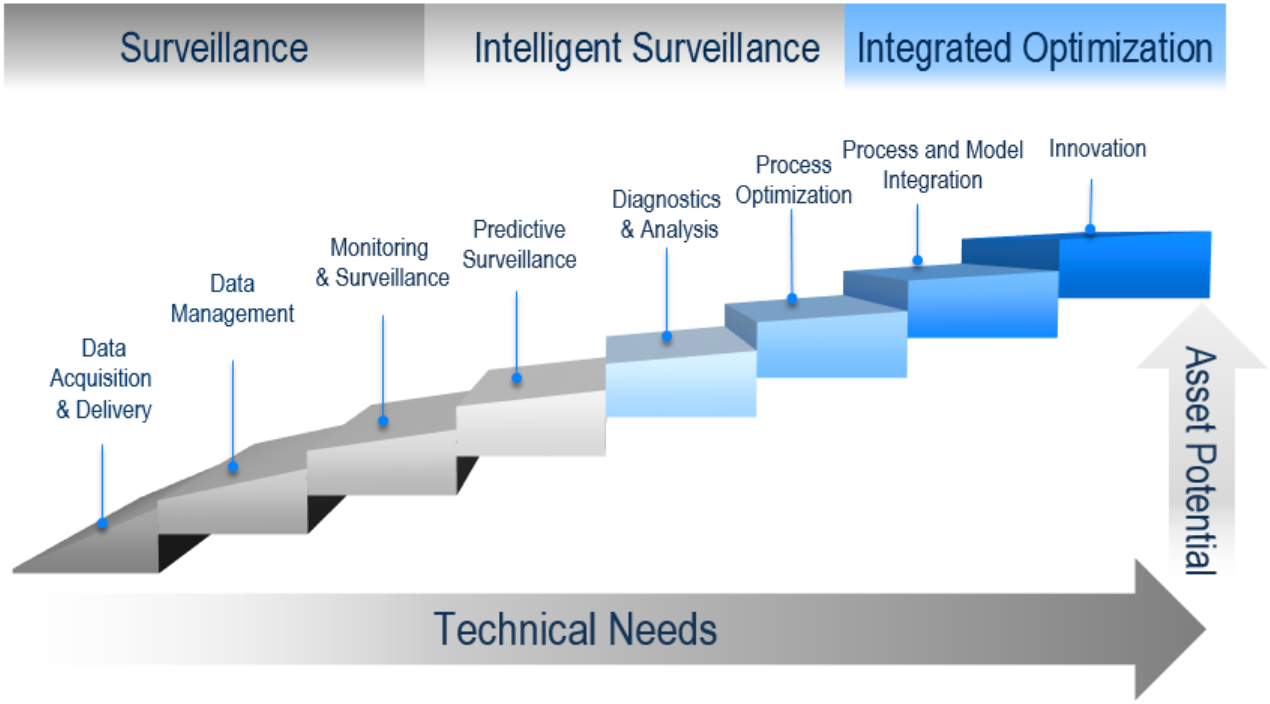
Asset Optimization Staircase



Engagement Levels

- Integrated Operations
- Asset Optimization
- Operations Solutions
- Production Data Management

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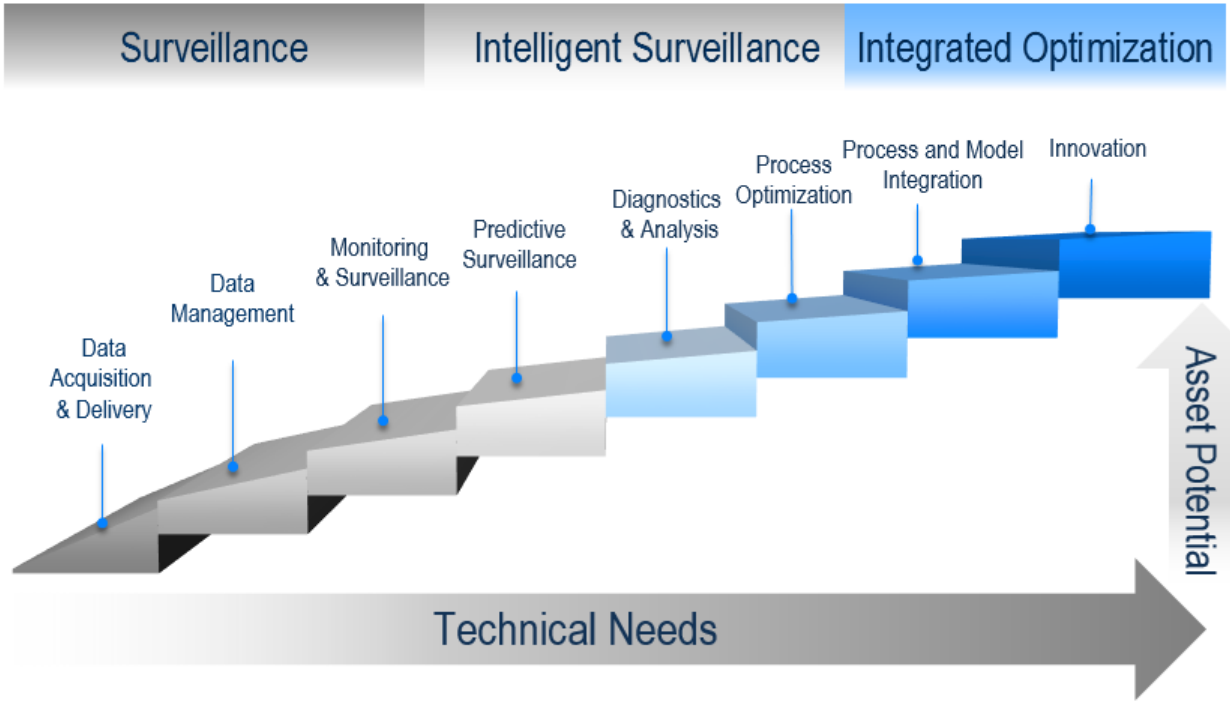

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Production Data Management Core functionality

Data Management

- Automated Data Acquisition
- Data Cleansing
- Auditability
- PROD/WITSML

Standards & Flexibility

- Manual Data Entry
- Security
- Extendable Data Model
- Industry Standard Calculations

Engineering framework

- Integration for model-based workflows
- Rate estimation
- Shortfall Management

Visualization

- Surveillance
- Reporting
- Web/Desktop
- Wellbore Schematic
- Business Intelligence

Extensibility

- Software Development Kit
- Integration with other Platforms

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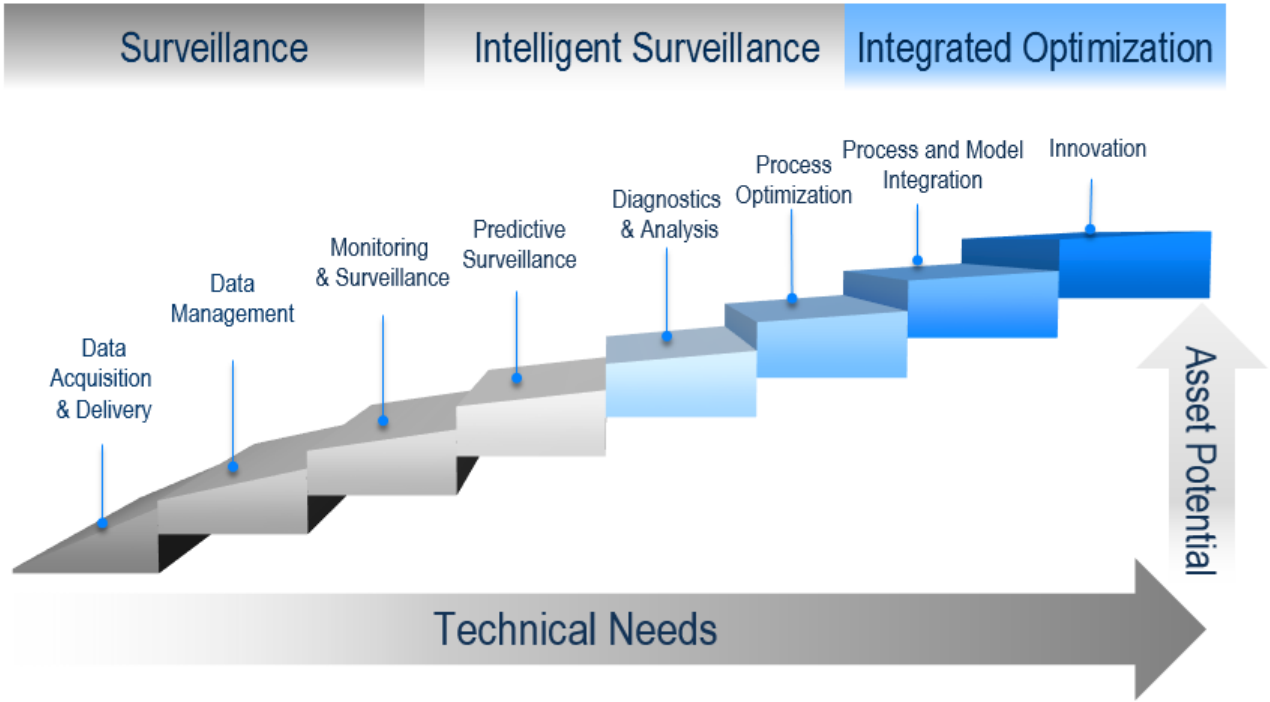

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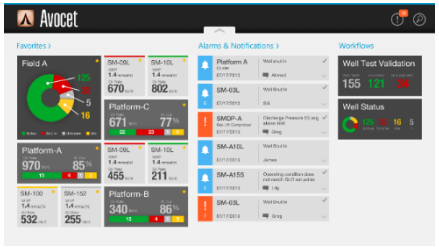
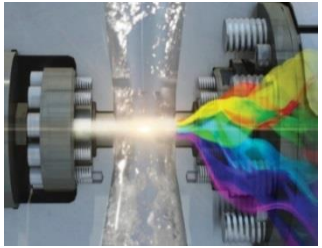
Building Blocks



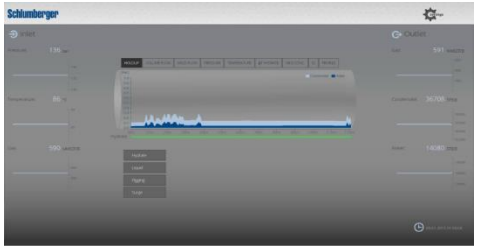
Well Rate Estimation

- Out-of-the-box solutions
- Best-practice workflows
- Model-based surveillance
- Upgradeable with other solutions
- Customizable on demand

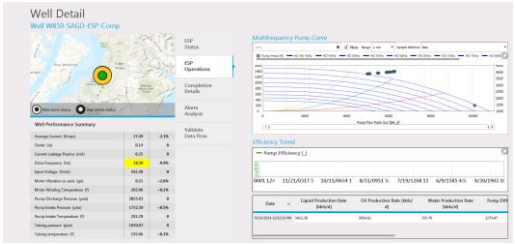
Well Performance



PRODcast Vx



OLGA Real-Time
Operations Solutions



ESP Surveillance

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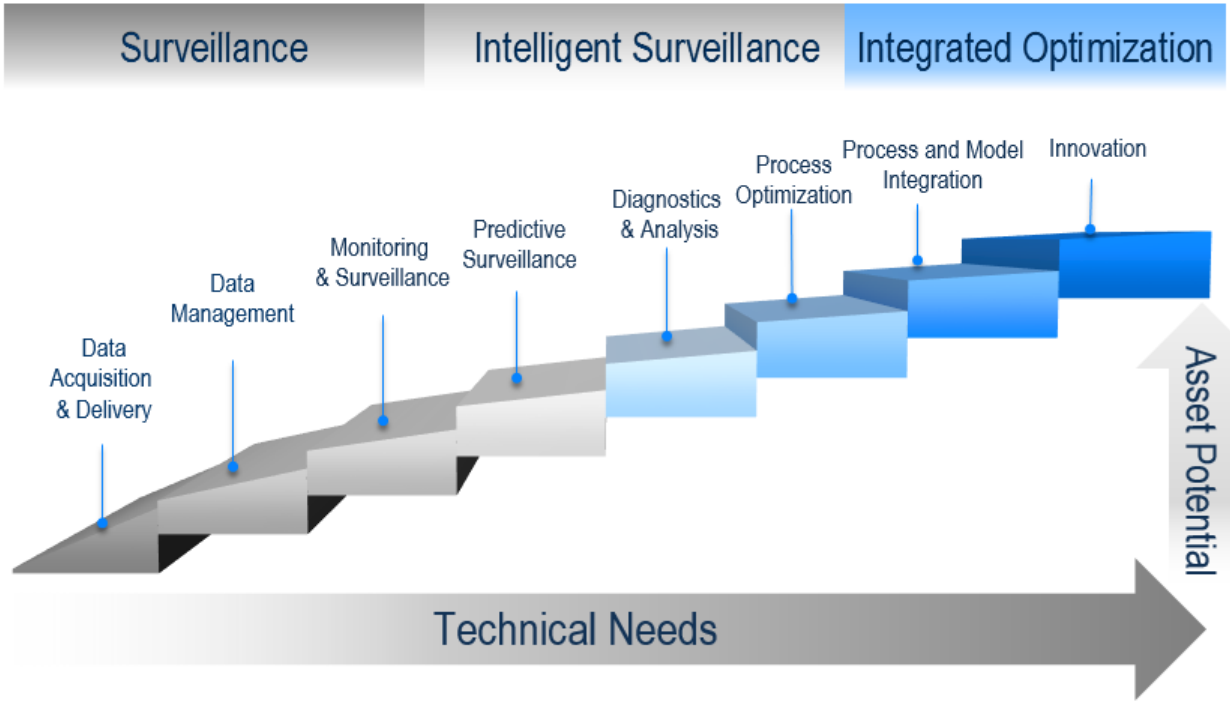
Asset Optimization Staircase



Engagement Levels

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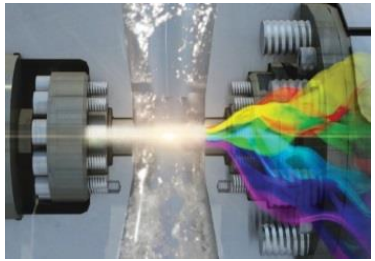
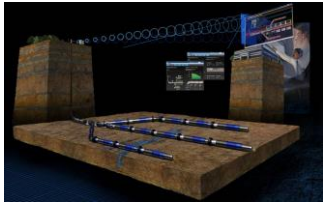
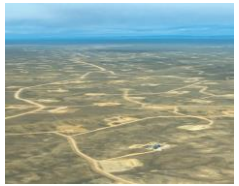
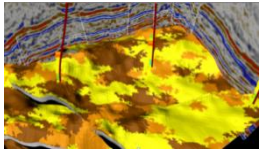
Asset Optimization Key Elements



Data Management and Technology Components







Domain Knowledge

Collaboration

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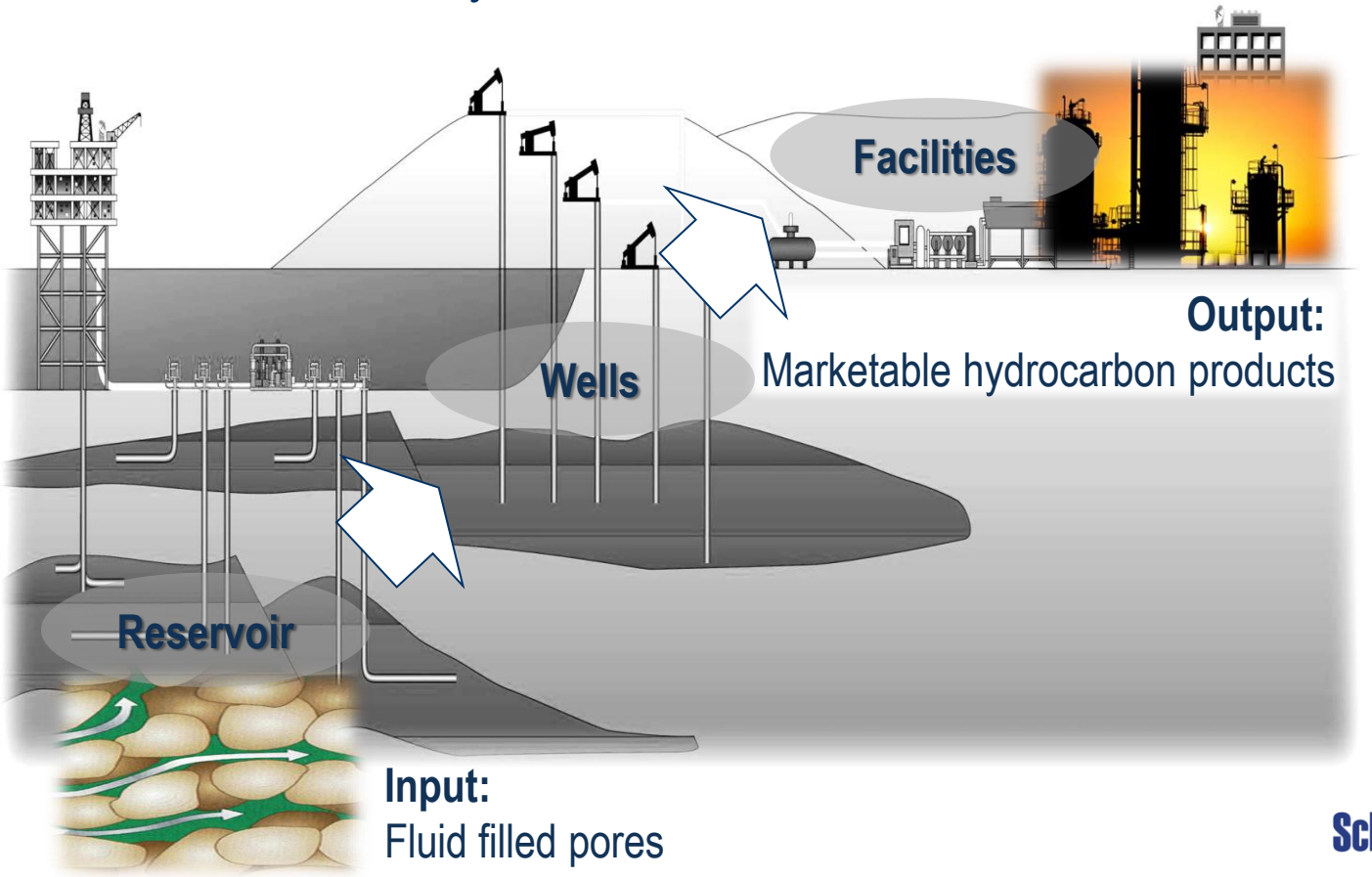
The Upstream Production System



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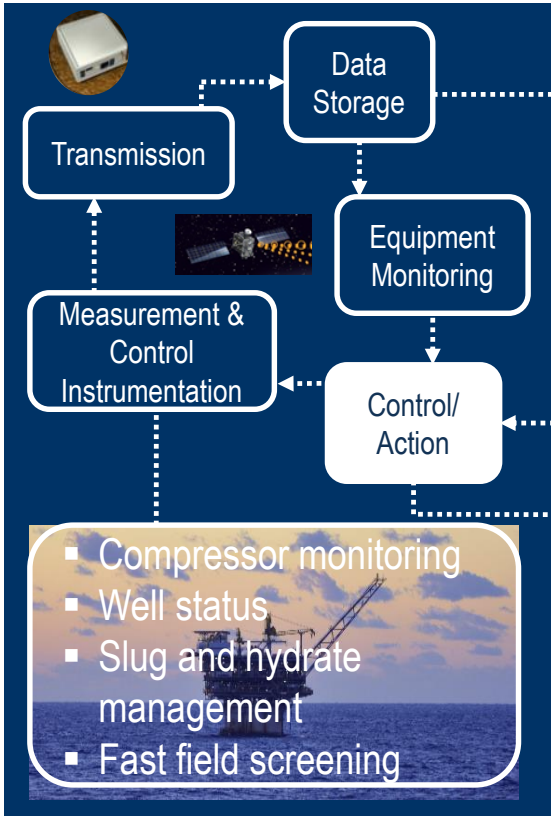
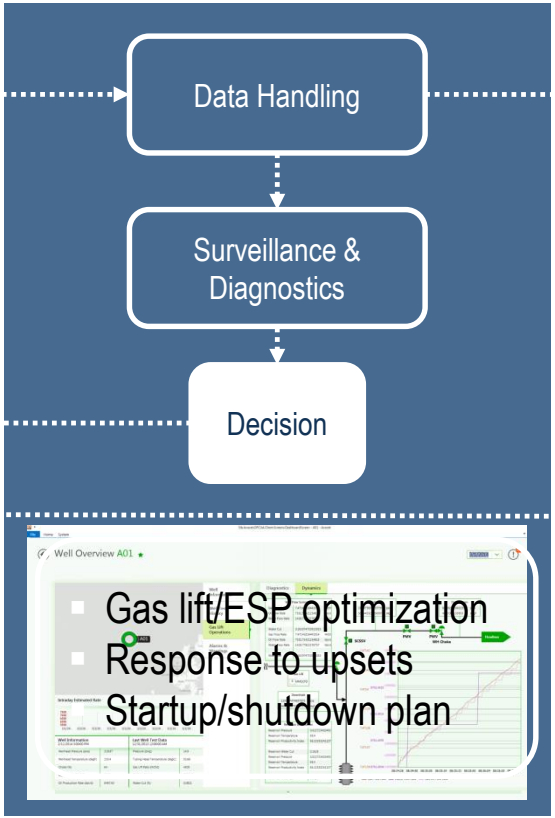
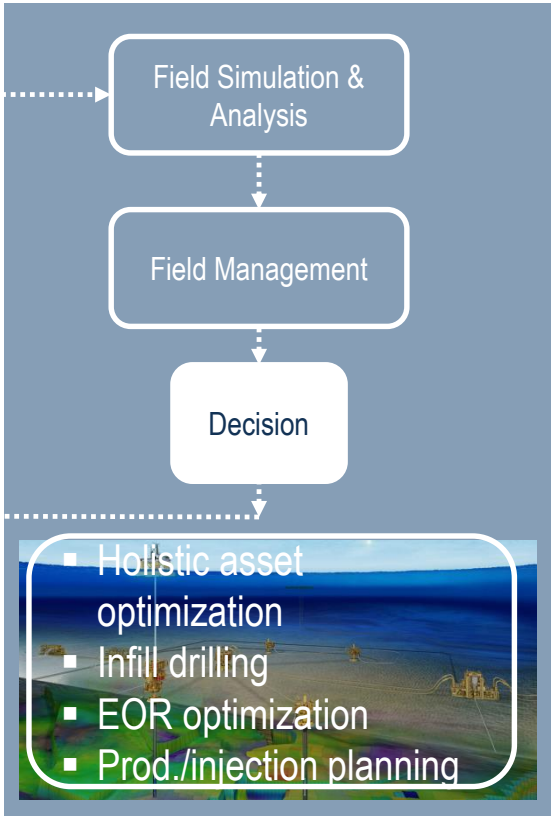
Asset Optimization in the Context of Time and Response



Fast Loop



Medium Loop



Slow Loop

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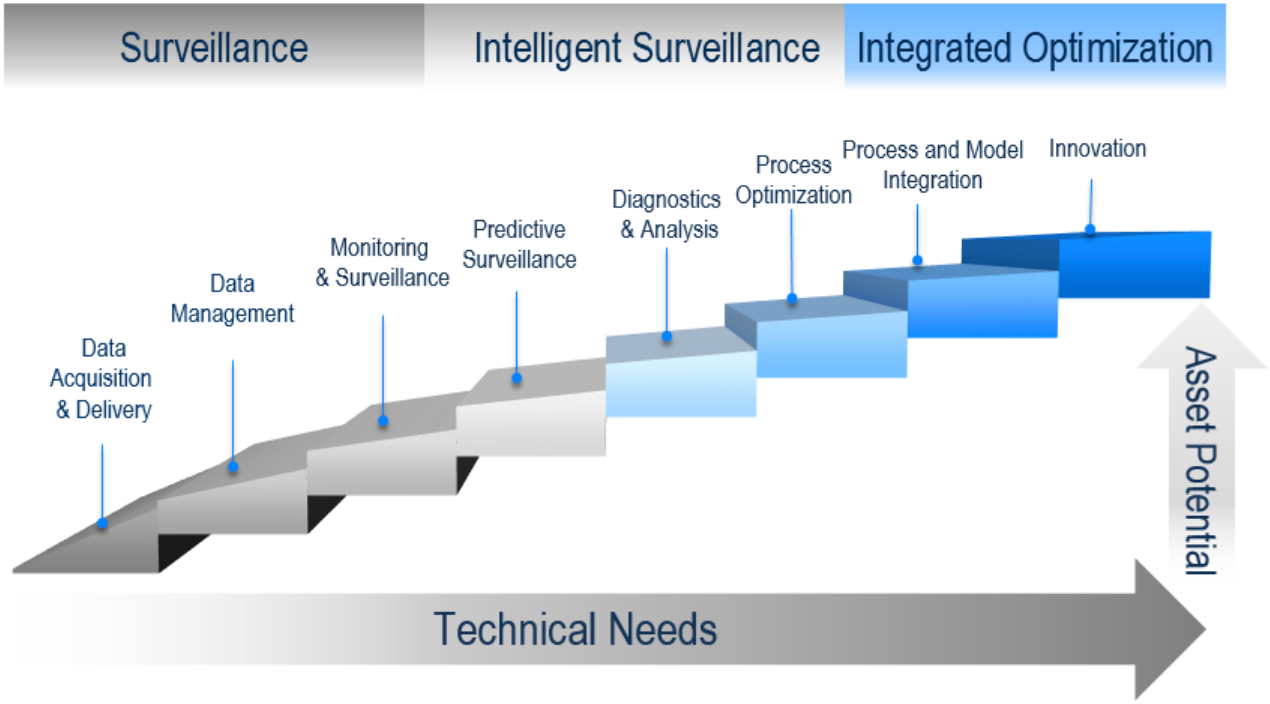
Typical challenges to be addressed by Asset Optimization

Asset Optimization Staircase



Engagement Levels

- Integrated Operations
- Asset Optimization
- Operations Solutions
- Production Data Management

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Integrated Operations Delivery Infrastructure

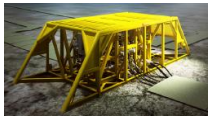
Technology	Software	Service

Multiphase Flow Meters

Testing Services

Artificial Lift

Completions



OneSubsea

Third-party technology

Reservoir Model — IX, ECL

Well Model — PIP, OLGA, OFM

Network Model — PIP, OLGA, IAM

Economic Model — M

Production Hubs:
- Houston, Oslo, Pune, KL, Perth, Villahermosa

Software Centers:
- Houston, Oslo, Abington

Local Delivery Sites:
- In over 100 Countries

Services Staff:
- 350+ PTE
- 1700+ services staff

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Agenda

- The Production Data Singularity
- Value-Added?
- Solution Components
- Component Example (MPRML)
- Summary

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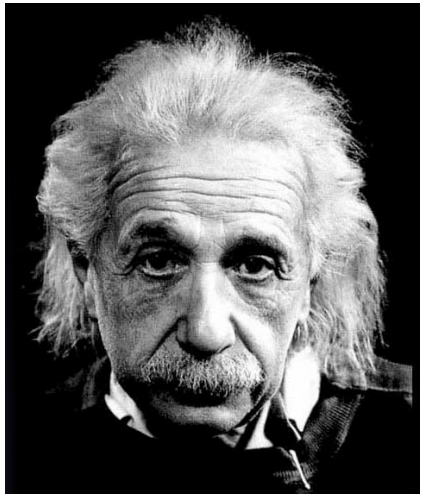
“Everything should be made as simple as possible, but not simpler.“

- Albert Einstein



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Reporting production data to ERH with Avocet

NPD: “Use of both the COPEX and MPRML formats will be permitted until 1 January 2016. After this date all reporting must take place in the MPRML format.”

Schlumberger provides a generic MPRML plug-in through the Avocet platform.

- Implemented and tested for a operator on NCS.

ERH – EPIM Reporting Hub
MPRML – Monthly Production Report Markup Language

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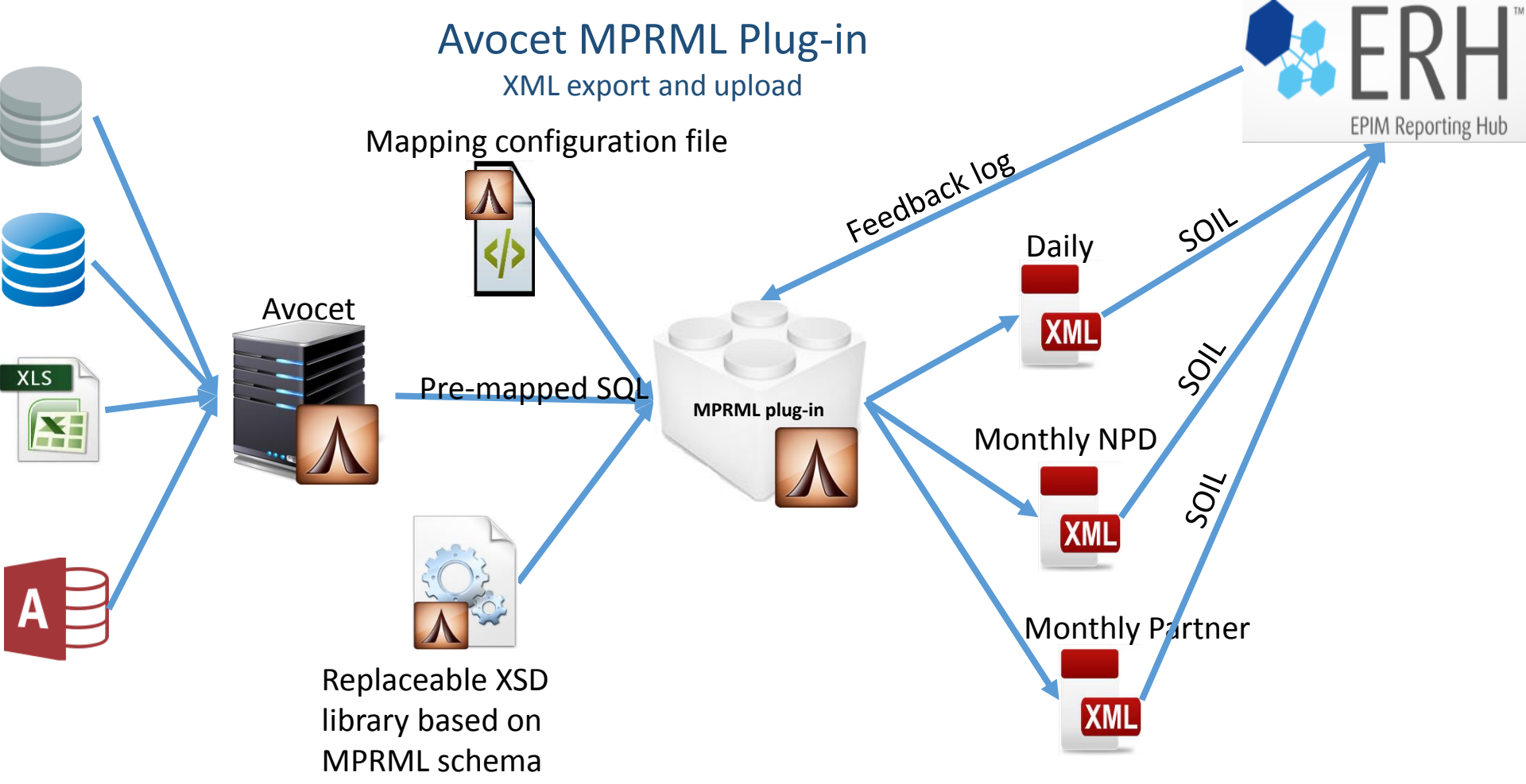
Avocet MPRML Plug-in

XML export and upload

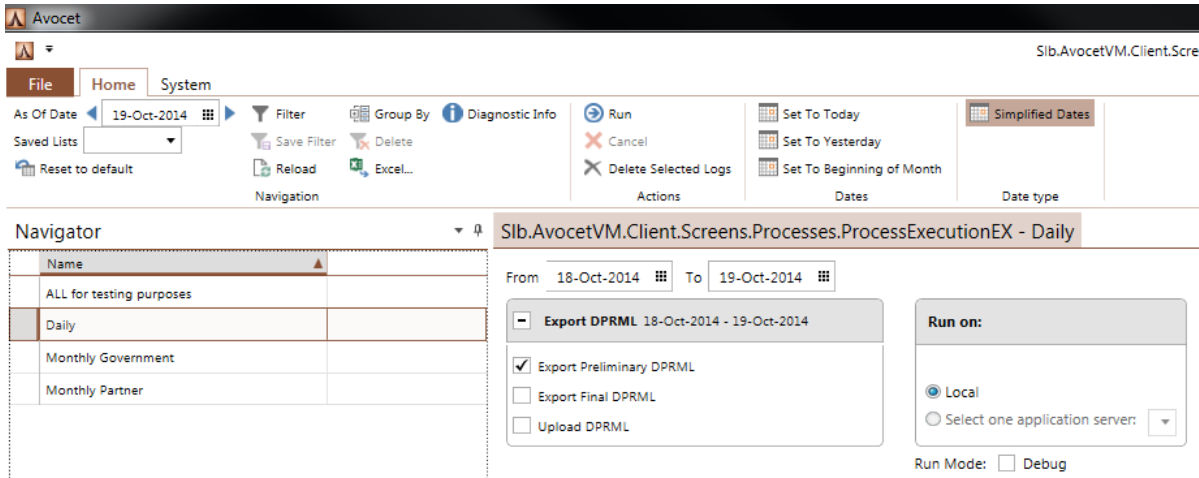


Data Inputs	Processes	Output

Summary of features

- Several report types
  - Daily partner
  - Monthly partner
  - Monthly government
- Version and status
  - Autoincrementing version
  - Preliminary/Final
- Upload to ERH process
- Possible to schedule and run in the background
- Pre-mapped to Avocet data structure

- Date stamped mapping configuration
  - Retroactive
- Easy update with new schema versions
- User friendly interface
- XML-based configuration
  - Changes can be done by user



Agenda

- The Production Data Singularity
- Value Added?
- Solution Components
- Component Example (MPRML)
- Summary

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Summary

- Keep momentum, enable transparency, think out of the box
- Automate non-value added activities
- Build architecture to support innovation
- Become compliant (MPRML)
- We can help you

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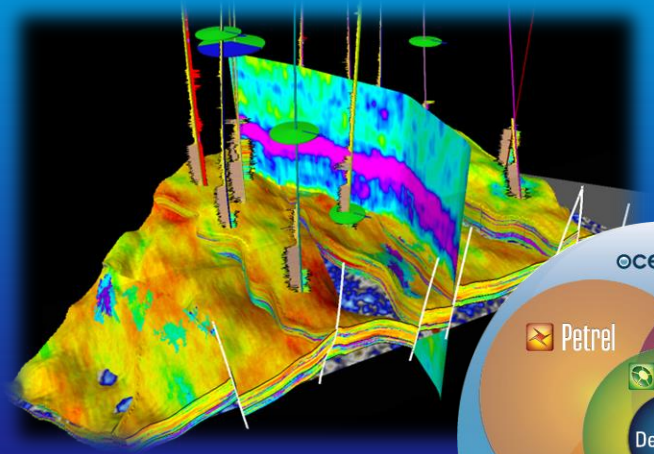

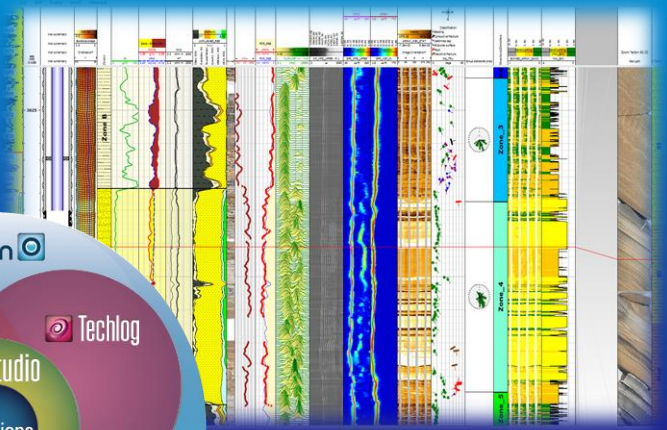

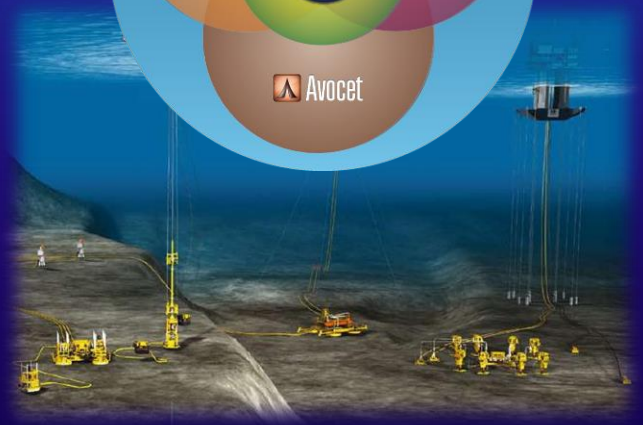

Thank you!

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