Online Data to Decisions and Value

Introduction

Asset Optimization Introduction (David Rossi, Scientific Advisor Asset Optimization, SIS)
- Agenda and objective for the workshop
- Schlumberger Asset Optimization (AO) solutions to enhance efficiency, production and recovery
- Solution implementation and enterprise value

Case Examples

Improved Modeling of Complex Production Systems (Daniel Pacho, IAM Expert BG)
Increasing Process Efficiency by Integrating Petroleum Engineering Workflows (David Talbot and Andrew Hyde, Petroleum Engineers, DEA)
Petronas IO Case Example: Samarang Field (David Rossi, SIS)

Looking to the Future

Operational Solutions – (Gustav Kjoerrefjord, Principal Consultant Asset Optimization, SIS)
- ESP Surveillance: Increase run life and enhance production
- Multiphase Flowmeters: Maximize your instrumentation investment
- Well Performance Surveillance
- Managing Pipeline Flow: Transient production management workflows

Open Discussion (Facilitated by David Rossi, SIS)
- Overview of survey results
- Experiences with DOF/IO initiatives, what works well
- Current challenges – Workflows, technology, deployment, change management, sustaining, support, other

Asset Optimization in Midstream Operations (Luis Fernando Cisneros, PEMEX Marine Southwest Region)
Open Discussion Survey
Asset Optimization - Improving Production Rates, Operational Efficiency & Reservoir Recovery

Introduction

The objective of Asset Optimization is to improve economic return, by increasing efficiency, accelerating production, reducing losses and maximizing ultimate recovery. A key to achieving this objective includes an efficient decision support system that automatically and efficiently:

- Reduces mountains of data to relevant information allowing users to manage production instead of managing data;
- Detects anomalous behavior within oil and gas fields and delivers early warnings and key information to users;
- Links all relevant information to applications, which assist users to perform analysis and modeling, in a guided collaborative environment, leading to better and faster decisions;
- Identifies optimal solutions and makes recommendations to improve performance, using modern algorithms and computing power.

A proper decision support system would be enabled with current and future measurement data, both subsurface and surface, along with other relevant field information.

The following questions pertain to activity within your company. Please answer these questions by considering the most significant field or asset within your company, or the field or asset with which you spend the most time.
Increasing Production Efficiency and Effectiveness Through Asset Optimization and Integrated Operations

David Rossi, Scientific Advisor
Schlumberger SIS
October 2015
Terminology

Industry terms
- Digital Oilfield (DOF)
- Integrated Operations (IO)
- Asset Optimization (AO)
- Field of the Future
  - i-Field
- Smart Fields
- Asset Integrated Management
  - KwIDF, GeDiG, SIAPPEP
Asset Optimization (AO)

Schlumberger DOF / IO solution providing integrated asset decision support

- **Online data** feeding petroleum engineering workflows
- **Efficiency** through automation of operational tasks
- **Increased production** rates by minimizing losses to hit targets
- **Effectiveness** through cross-discipline collaboration
- **Technology** linking online data and information, people skills and work processes to enterprise / organization
Decisions: Multiple Domains and Scales

- Safety and integrity
- Reduce downtime; early problem detection
- Minimize operation risk
- Reliable production KPIs

- Anticipate production issues
- Maximize production
- Meet forecast
- Optimize production parameters (gas lift)

- Maximize recovery
- Better understand the reservoir
- Develop a better FDP
- Integrate different disciplines around a common vision
Decision Workflow
From Data to Decisions

5: **Optimization**: decide, verify, act

Which is the best path forward? (requirements, constraints, economics)?

4: **Analysis**: scenario evaluation, what-if model

What are the alternative ways to manage risk or improve moving into the future?

3: **Model Management**: tune, calibrate, update

Does the model need changing?

2: **Diagnostic**: identify root-cause and troubleshoot

What is the problem root cause?

1: **Surveillance**: detect, recognize issue

Anything causing trouble now? If no settings are changed, will anything cause trouble in the future (look ahead)?

Data Validation

Data Management

Data Transmission

Field Sensor / Control
Asset Optimization – Challenge Areas

- Well Performance
- Integrity & Safety
- Field Operations
- Asset Management
- Lifting & Pumping
- Reservoir Optimization
- Flow Assurance
- Field Operations
Asset Optimization – Solutions

**Well Performance**
- Monitor & Diagnose, Allocation, Losses, Rate Estimation, Transient Analysis

**Integrity & Safety**
- Corrosion, Erosion, Leak Detection, Vibration, Wear/Tear, Sand Avoidance, Maintenance

**Field Operations**
- Equipment Surveillance, Field Operations, Pigging, Ramp Up, Virtual Flow Metering

**Asset Management**
- Delivery Assurance, Forecasting, Scheduling, Blending, Nominations, Well Routing, Choke Optimization, System Management

**Lifting & Pumping**
- Monitor & Optimize ESP, Gas Lift, PCP, SRP, Subsea Booster Pumps

**Reservoir Optimization**
- Pressure Support, Reservoir Sweep, Injection, Flooding, Water, Gas, Steam SAGD, WAG Cycling, Zonal Control

**Flow Assurance**
- Hydrates, Wax, Scale, Asphaltenes, Cool Down, Inhibitors

**Monitor & Diagnose**
- Monitor & Diagnose, Allocation, Losses, Rate Estimation, Transient Analysis

**Allocation**
- Allocation

**Losses**
- Losses

**Rate Estimation**
- Rate Estimation

**Transient Analysis**
- Transient Analysis

**Lift Gas, PCP, SRP Subsea Booster Pumps**
- Lift Gas, PCP, SRP, Subsea Booster Pumps

**Pigging**
- Pigging

**Ramp Up**
- Ramp Up

**Virtual Flow Metering**
- Virtual Flow Metering

**Equipment Surveillance**
- Equipment Surveillance

**Field Operations**
- Field Operations

**Pigging**
- Pigging

**Ramp Up**
- Ramp Up

**Virtual Flow Metering**
- Virtual Flow Metering

**Hydrates, Wax, Scale, Asphaltenes, Cool Down, Inhibitors**
- Hydrates, Wax, Scale, Asphaltenes, Cool Down, Inhibitors
VALUE
Revenue – CAPEX – OPEX ± Intangibles

Revenue / Deferred Production
- EBS: detect losses quickly
- Unplanned downtime
- Continuity of operations
- Problem prediction: hydrate, wax
- Maintenance disruptions

Revenue / Accelerate Production
- Optimize transient operations
- Optimize resource use
- Understand operational constraints

Revenue / Recovery
- EOR, flooding, thermal
- Pressure support, voidage
- Zonal sweep and drainage
- Reduce field economic limit

OPEX / Efficiency, Productivity
- Automation; by exception mgt
- Field crew size
- Maintenance cost
- Chemical inventory
- Gas volume
- Shared SMEs
- Mobile data solutions
- Power consumption
- Rig time
- Logistics

Penalty Avoidance
- HSE incidents
- Contract penalties
- Travel
- Personnel

CAPEX / Investment
- Number of wells
- Surface equipment
- Capacity planning
- Equipment run life
- Loss of capital equipment
- Supply chain

Operational Excellence
- Standardized workflows
- Best practices
- Knowledge capture
- Open and inter-operable systems
- Collaborative teams
- Reuseable advisories
- Reduced uncertainty
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### OPEX / Efficiency, Productivity
- Automation; by exception mgt
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### Penalty Avoidance
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Asset Optimization Steps

Monitor

1. Instrumentation & Data Delivery
2. Data Management
3. Monitoring
4. Surveillance

Model

5. Diagnostics
6. Model Management
7. What-If Analysis

Maximize

8. Optimization

Integration, Collaboration, Transformation

Value

Asset Optimization

What-If Analysis
Operational Excellence

High-value algorithms, role-based processes
Solution Delivery: AO Key Elements

- Wellsite Technology
- Equipment Reliability
- Data Communication
- Data Management

- Workflows and Models
- Algorithms and Analytics
- People Skills
- Collaboration

- Surface and Subsurface Domain Knowledge
- Job Planning and Scheduling
- Logistics and Maintenance
Getting Started: Scoping Workshop and Assessment

1) Scoping workshop
2) Assessment
3) Design
4) Deployment
5) Management service

Standard methodology for all field settings

- Deepwater greenfield
- Offshore field development
- Midstream pipelines
- Shale CBM
- Heavy Oil
- Brownfield EOR
The End