Our Vision – Improved Process Safety and Compliance

- Manage Risk & Compliance Proactively
- Establish BSEE As Regulatory Leader
- Collaborate as 1 Integrated Team
- New Capability – Step Change
- Value
BSEE Goals

• Our collective goals include instilling a stronger sense of safety and environmental responsibility among operators, while promoting compliance with regulation.

• We face the challenges of keeping pace with technological and process innovations from operators and equipment manufacturers as well as developing analytic tools that will enable us to compare, assess, and identify risks earlier.

• To achieve our goals and overcome these challenges, we need to build upon the skills of everyone at BSEE while also recruiting and retaining the best talent.

• We must develop performance metrics that measure our results.

• We must consistently communicate our progress.
The industry is Now Open to New Solution Leadership

*It is not about well control, it is about:*

- Process Safety
- Well Incident Avoidance
- Operational Safety, and
- Environmental Compliance

◆ Access to Real-Time Data
  ◆ Real-Time Monitoring & Analysis

◆ Proactive Trends, Warnings & Alerts
  ◆ Access to Experts Worldwide

◆ Collaboration from anywhere, anytime and with anyone

◆ Keeping focus on critical issues & compliance

◆ Better leverage lessons learned

◆ Leverage Global Resources
Real Time Systems: Offshore Reliability and Process Safety

- Develop Real Time Systems which facilitate clear differentiation between Process Safety and Personal Safety
  - The Macondo catastrophe was first and foremost a failure to manage Risk and Process Safety

- Real Time Systems represent BAST, if engaged properly
  - Focus on Real Time Systems for Decision Quality
    - Industry
    - Regulators
  - Require Real Time Systems and data for Regulatory compliance
    - Embedding initial compliance issues, i.e., margin relationships
    - Testing such as BOP’s, LOT/FIT, Barrier Tests, Zonal Isolation, Well Control, etc.
    - Enable uncertainties management in real time, drilling margin variance and deviations from plans
      - Stop work
      - Management of Change

- Offshore Regulatory Projects
  - Focus on Regulatory developmental projects with systems that manage risks in collaboration with industry
  - Develop Real Time System that promotes training and hazards simulations – as a project

- Offshore Process Safety Improvement
  - Develop Regulatory Real Time Centers for complex well monitoring, and
    - RT Compliance & Reporting monitoring
    - Hazards Simulators
    - Training

- Regulations requiring RT data and reports to BSEE

* As defined by Dr. Robert Bea: The proactive, interactive, and reactive integrated continuous processes whose goal is prevention and mitigation of major disasters involving complex engineered systems.
The Current State of Monitoring: *A Reality Check*

Regarding Optimization, speed, fast ROP - it is a nice outcome, but here is reality:

- **Hypothetically, presume:**
  - A Deepwater budget of 2 Billion USD
  - NPT of a typical 40%
  - Estimated efficiency improvements of another 25%
  - Therefore, NPT value = 800,000K US$. Efficiency = 500,000K US$, Round to 1 Billion US$

- **IF**, those improvements could be realized in optimization overnight, it would take over 50-80 years to pay out one MACONDO catastrophe ($50-$80 Billion):
  - There is also the loss of lives and the long term impact to the environment!
    - Damage to Energy policy & goal of energy independence from imports
    - Damage to reputation and the industry as a whole
    - Damage to other industries

- That is why the industry needs Regulatory leadership to invoke a step-change in how it operates

- It is about Process Safety, Risk Management and Regulatory Compliance!
Needed: **Real-Time Software Application Enhancements**

We need to incorporate: **Intelligent Agents (IA)**

*This includes multiple well data trends and their co-dependencies over time, which when compared and analyzed, give indications of current or impending well events and/or challenges*

**A Phased Development Process Is Recommended to Address this Need**

- Identify the key data combinations that make up the Intelligent Agents (trends and their co-dependencies) which identify potential impending drilling events/challenges/trends
- Utilize application algorithms that encapsulate these trends with their co-dependencies and integrate them using real-time data
- Utilize initial “triggers / alerts” that immediately notifies these trends to the attention of all responsible parties in real-time & journalize these as they occur
Levels of Risks also imply consequences as Probabilities increase as levels of a Risk Profile are encountered.
## Linkage Between RT and Process Safety

<table>
<thead>
<tr>
<th>Capability</th>
<th>How?</th>
<th>Process Safety Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor rig/well data in real time</td>
<td>Regulations requiring RT data and Reports to BSEE Existing, New, Future</td>
<td>More Regulatory Compliant Operations</td>
</tr>
<tr>
<td>- Weight on Bit</td>
<td>- Intelligent Agents</td>
<td>Improve Environmental Oversight</td>
</tr>
<tr>
<td>- Rate of Penetration</td>
<td>- Continuous Improvement</td>
<td>Reduced risk on next Macondo complexity well</td>
</tr>
<tr>
<td>- Hookload variations (buoyancy)</td>
<td>- Pressures and volumes</td>
<td>Improved Lessons Learned Knowledge and Incident Capture</td>
</tr>
<tr>
<td>- Torque/Drag</td>
<td>- Mechanical Specific Energy</td>
<td>- Motor and Bottom Hole Assembly dynamics</td>
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<td>- Pressures and volumes</td>
<td>- Mud log data, gas or hydrocarbon levels, mud weight and lithological trends</td>
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Integrated Operations

Based on an Collaborative Approach to Work Flow

G&G Global Expert Resources

Collaborative Well Planning & Delivery

D&C Integrated Global Operations

Real-Time Data Monitoring (Trends, Analysis and Alerts)

High Performance Work Flow using Collaborative 2D & 3D Visualization

Real-Time Application Resource Monitors, Facilitators & Trainers

Enabled with 21st Century Technology Solutions in a fully Integrated Real-time Data Environment
Real Time Systems and Virtual Well Monitoring

- Align processes from well planning through to execution – Integrated operations
  - RAM
  - BORA
- Link to closed loop data systems: i.e. Managed Pressure Drilling
- Overall goals and objectives:
  - Provide a seamless data infrastructure system from the well to the control room and other associated monitoring centers
  - Deploy well control safety alert trending
  - Enable global, multi-discipline collaboration in real-time where everyone sees the same data in the same view
  - Provision plans for:
    - Monitoring processes and procedures
    - Determining bandwidths of Intelligent Agents: Drilling and flat-time alerts
    - Recognize, alert and record Management-of-Change events
      - Changing geological uncertainties and predictions
      - Changing drilling margins: Pore pressure/Fracture gradient
Intelligent Agents – Overview by Example
Next Steps
What Are We Proposing to BSEE

Development of Real Time Systems and Enabling Software that enhances Process Safety *first*. This will create the foundation to establish a BSEE Real Time Environment to promote:

- Situational Awareness for complex wells
- Testing Verification and Compliance
- Support applicable SEMS proactive engagement for
  - Operator Collaboration
  - Management of Change
- Enhance Process Safety understanding, assurance and training
- Enable Hazards Simulation Training
  - Regulators
  - Industry