

Our Vision – Improved Process Safety and Compliance



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

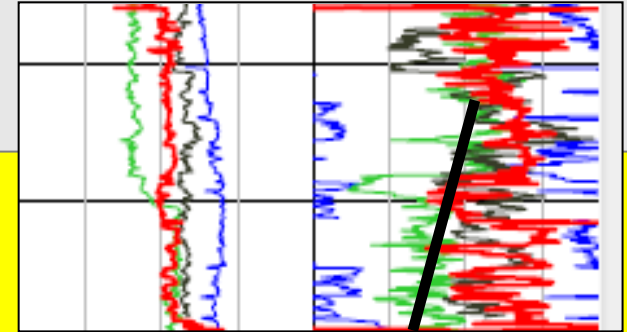
◆ Better leverage lessons learned

◆ Leverage Global Resources

- 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 !

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

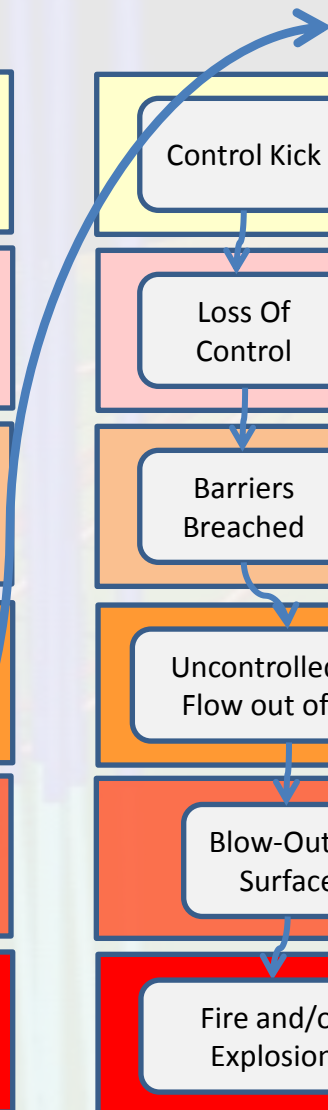
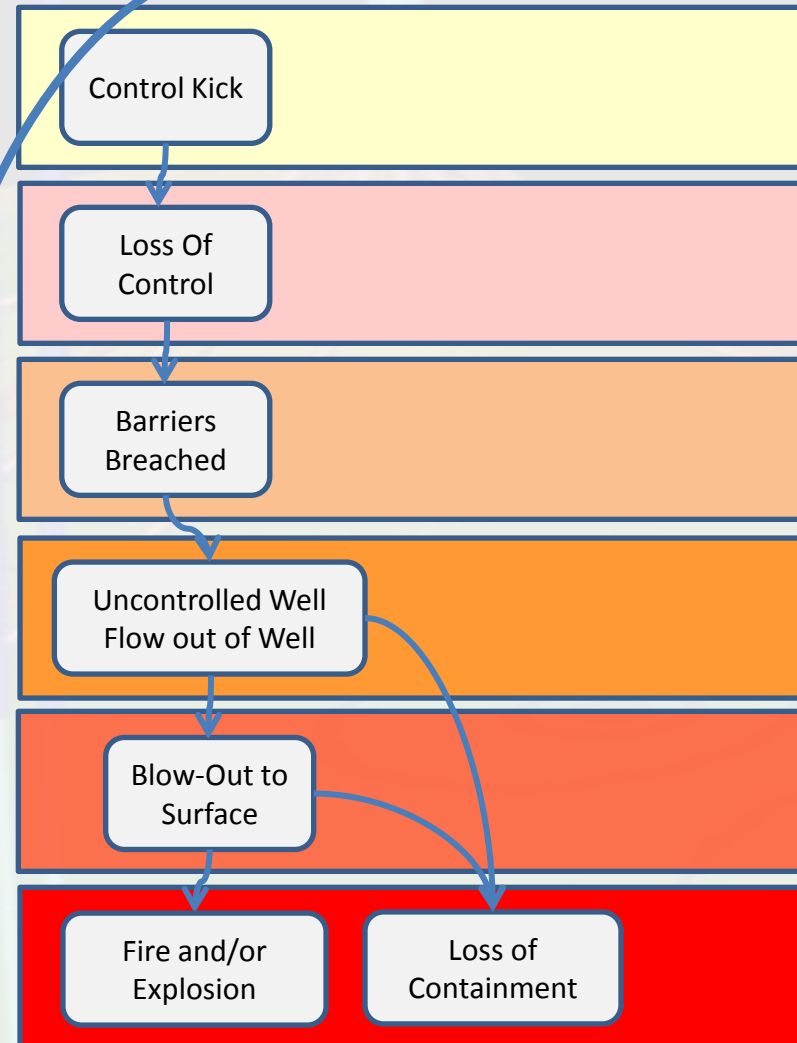
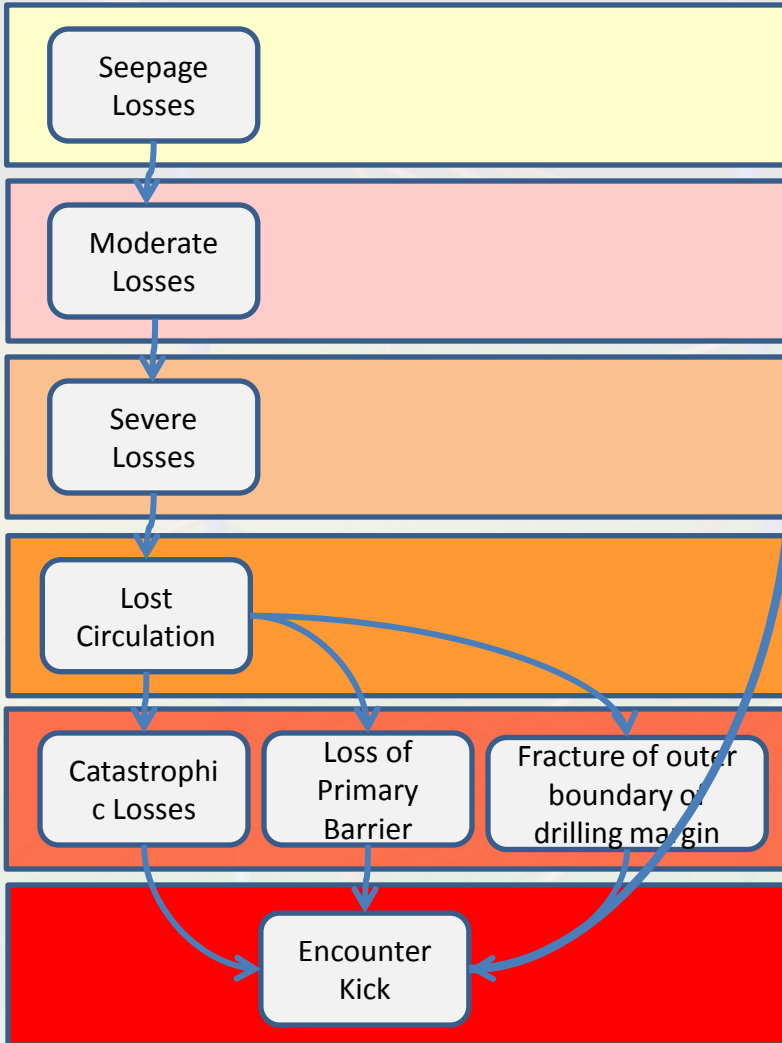
A Phased Development Process Is Recommended to Address this Need

- 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

Drilling Operation - Risk Profile Example Models

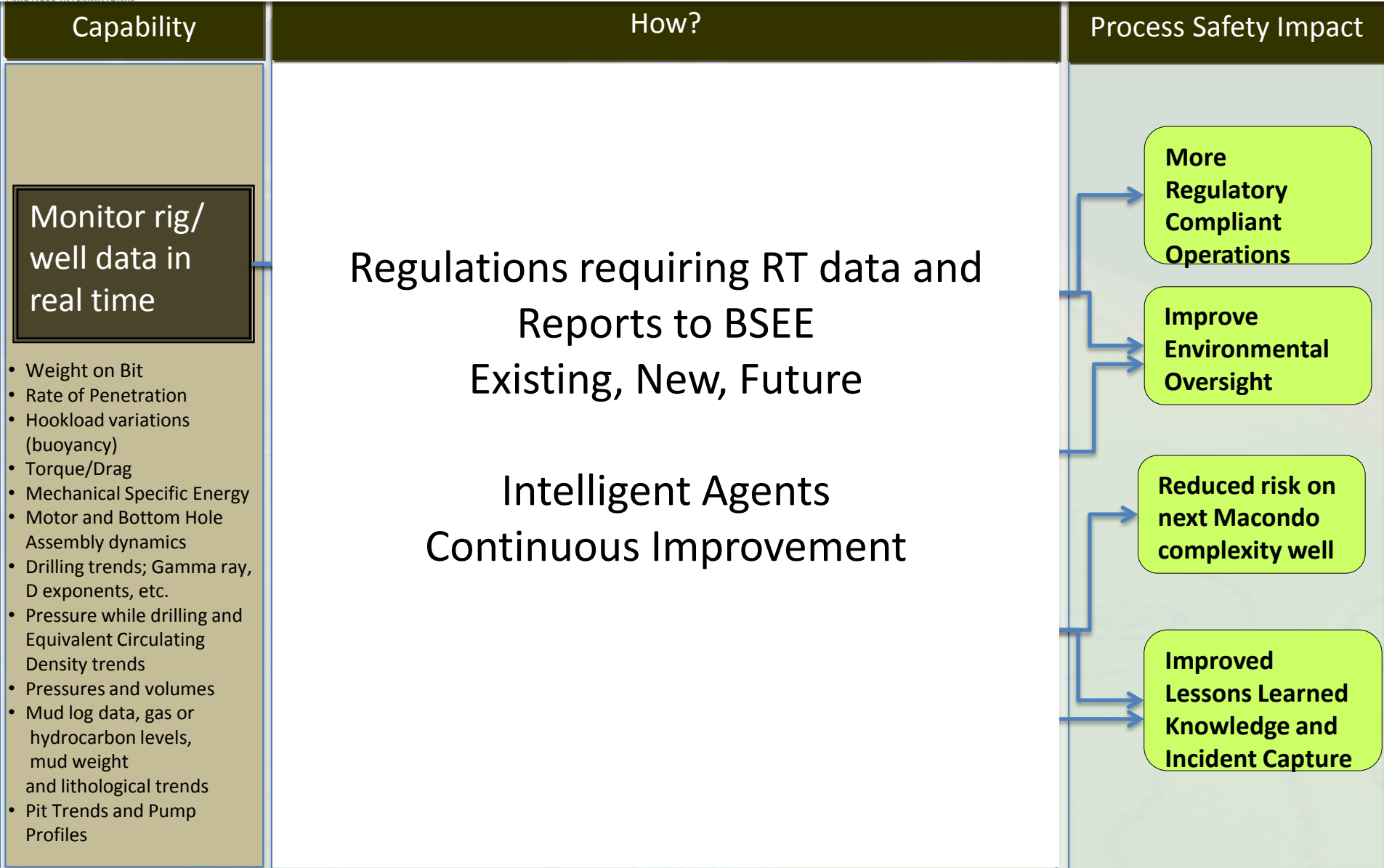
Uncertainty: Pore Pressure/Fracture Gradient
Risk: Fluid Loss while Drilling

New Risk: Encounter Kick



Levels of Risks also imply consequences as Probabilities increase as levels of a Risk Profile are encountered

Linkage Between RT and Process Safety



Integrated Operations

Based on an Collaborative Approach to Work Flow



Enabled with 21st Century Technology Solutions in a fully Integrated Real-time Data Environment

- **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