DrillSage™

PROACTIVE | DRILLING | SOLUTIONS

WWW.DRILLSAGE.COM

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INTRODUCING THE REAL TIME ADVISORY SYSTEM - RTAS™

Real-time analysis and proactive 'watches' deliver reliable, cost efficient drilling & barrier management operations.

Real-time system: from the well plan, to simulation and training.

LATEST SOFTWARE TECHNOLOGY

DRILLSAGE, LLC utilizes a new purpose driven software design coupled with the latest internet technology and security.

RTAS is vendor neutral and can use any WITSML data.

The industry has a unique, growing set of problems that require new and effective solutions:

- **Experience levels** at the rig site and the office have decreased significantly.
- The pace of **drilling and complexity** of wells is increasing while experience is decreasing.
- **Cost** pressures and metrics drive aggressive well plans and **faster** well drilling **rates**.
- **Major incident** rates **are** not decreasing, they are **increasing.**

BENEFITS OF THE REAL TIME ADVISORY SYSTEM, RTAS™:

REDUCE AVOIDABLE LOST TIME

RTAS™ utilizes forward looking watches to proactively reduce lost time often as high as 25-50% of total drilling time.

RTAS: key features:

- Real-time monitoring, analysis, and reporting of actual well data compared to imported pre-drill models
- Pore pressure and fracture gradient
- Torque and drag, Hydraulics
- Automatic notifications of deviations from models, company set limits, or regulatory thresholds
- Comprehensive audit log / trail of well conditions, crew actions, and system notifications
- Analog capable for data imports of pictures

PROACTIVE MONITORING

A PROACTIVE, unique real-time monitoring and analysis system designed to:

- Identify evolving drilling hazards that impact downhole wellbore conditions
- Provide forewarning using 'watch' alerts
- Allow company/user customization for proprietary needs
- Overcome the lack of flexibility in existing systems
- Provides interface and compliance with sections of the 2016 BSEE Well Control Rule

RTAS is designed as a proactive system providing analysis and forewarnings.

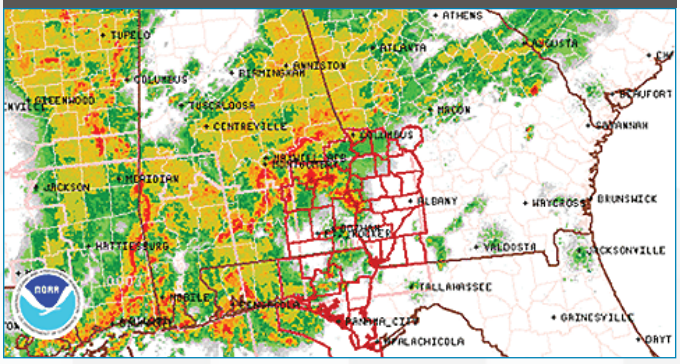
The RTAS system continuously monitors and analyzes real-time data that signal initiation of an evolving hazard such as stuck pipe, cuttings loading, fluid barrier degradation, mass imbalance, and kicks.

See next page for an example of an RTAS proactive watch.

REACTIVE:

A tornado warning, or an "alarm" is only issued when an actual tornado is identified and the storm is underway - a tornado has already occurred. Reactive.

PROACTIVE:



The Weather service issues tornado "watches", alerts for conditions of atmospheric pressure, wind currents, humidity, and temperature variations that could lead to tornadoes.

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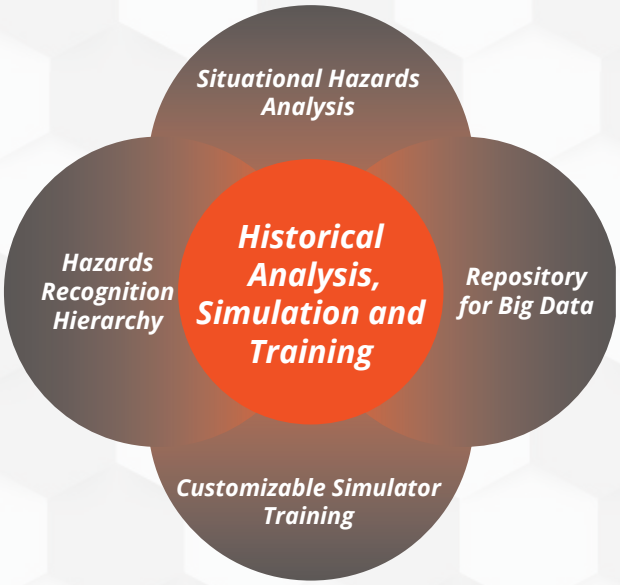
USE RTAS™ TO MINE EXISTING HISTORICAL DATA

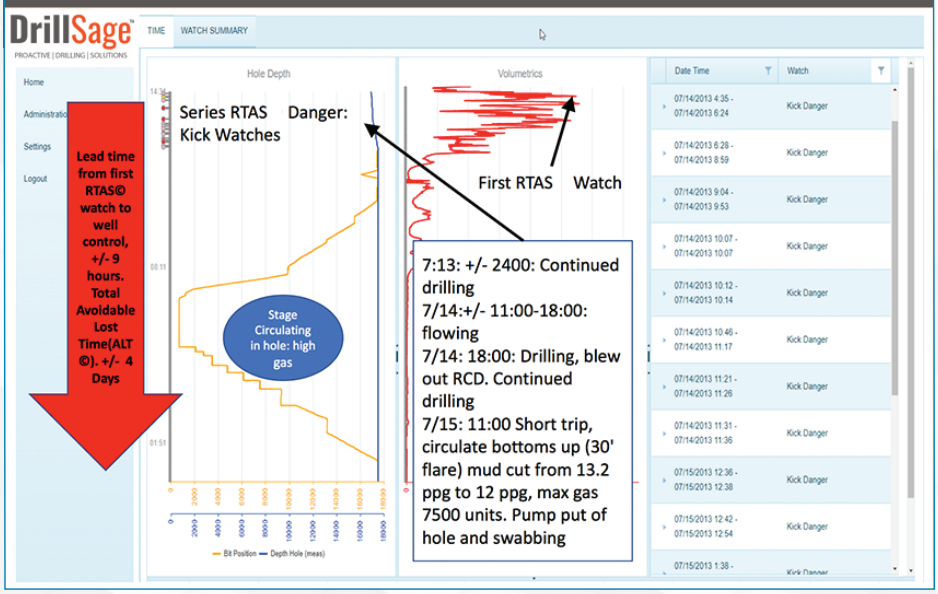
AN INDUSTRY FIRST

What can be done with Historical Analysis?

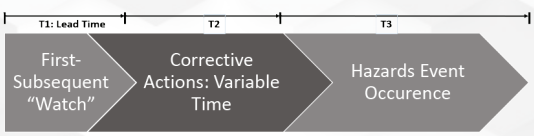
- Upload and analyze WITSML data from any vendor from a typical historical well in moments enabling:
  - Post appraisal, root cause analysis
  - Design practices and procedures
- Understand applied wellbore physics in response to subsurface trends and uncertainties
- Customize and create specific simulation and training templates and venues
- Facilitate multidisciplinary collaboration by synchronizing geoscience logs and data with engineering data



EXAMPLE WELL: WELL CONTROL



RTAS: Well Control Support and Loss Prevention



Avoidable Lost Time™ - ALT™

Leading KPI's: 'Watches' identify deteriorating wellbore conditions facilitating:

- **Avoidable Lost Time™** is a new, unique measurement that represents the totality of elapsed time from first proactive watch of an evolving hazard, until the watch condition is corrected, or the event actually occurs, plus the time to return to the critical path of the well plan
- Measuring lost time: Intervention Action Time (T1)
- Measuring the time for Intervention Action (T2)
- Measuring the time taken, if a hazards event occurs, to return to the well plan (T3)

UPLOAD & ANALYZE WITSML DATA

FROM ANY VENDOR

CASE HISTORIES OF AVOIDABLE LOST TIME

THE $ VALUE LOST

RTAS™ Analyzed Case Histories of Lost Time: The $ Value Lost

Drilling Conditions	Welbore Analysis	Lead time / Failure Costs
Deepwater		
• Fast drilling, cuttings loading, ECD upward creep above LOT, fast ROP continued • Massive losses, fractured wellbore, lost primary barrier.	• ECD was too low to counter-act the pore pressure, yet too high to avoid massive fluid losses.	**Lead time from First Watch alert to wellbore failures: 13 hours** • 12 days of Avoidable Lost Time, $ 20,000,000 sidetrack.
Canadian Rockies		
• Standpipe, motor differential, torque and pressure increasing. Gas levels and flow increasing significantly, kick.	• Pressure transition was detected in RTD and drilling continued.	**Lead time from First Watch alert to wellbore failures: 1 hour** • $4,500,000, plus added casing, tools, and services • Loss of well and drilling program canceled.
Coventional: South America		
• WOB was almost doubled at tour change. Torque trend and pump pressure and ROP increased dramatically.	• Signatures of cuttings loading, exceptionally fast ROP. Stuck pipe.	**Lead time from First Watch alert to wellbore failures: 13 hours** • $1,400,000 direct, plus tools and service.
Uncoventional: Eagle Ford		
• Pump pressure trends began decreasing, flow losses detected. Torque increased. Lost primary barrier, stuck pipe.	• The signatures of impending stuck pipe were evident.	**Lead time from First Watch alert to wellbore failures: 3 hours** • $1,600,000 direct, plus tools and service.
Uncoventional: Eagle Ford		
• Differential pressure, pump pressure began decreasing, gas levels increasing • Drilling continued at fast ROP, seal ruptured on the rotating control head. Sour gas and raw condensate blew over the derrick.	• Impending kick evident.	**Lead time from First Watch alert to wellbore failures: 9 hours** • $450,000 direct plus tools and service.

Our analysis of wells with the **RTAS system** has shown a minimum of an about an hour to a maximum of about 30 hours of actual lead time on developing problems. In addition, the added **avoidable lost time** if a hazards events occurs is an enormous cost to the industry: Kicks, well control, stuck pipe, sidetracks, loss of barrier, not to mention the Health Safety and Environmental aspects and related costs. RTAS facilitates opportunities to engage **corrective actions for hazards avoidance in real time**.

KEY MANAGEMENT PERSONNEL

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CEO: Chad McNair

Over 25 years of investing and launching successful business ventures and serves on numerous profit and non-profit Boards. Chad is a Civil Engineer with an MBA in finance from The University of Houston

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CFO: Jesse E. Roye

Over 40 years of global E&P engineering and IT management experience and D&C real-time monitoring center management: Majors, Super Majors, and Service Providers

CTO: David M. Pritchard

Over 40 years of global engineering and supervisory experience: Majors, Super Majors, Independents, NOC'S and Service Providers