Webinars

Welcome!

The program will begin soon.

You will not hear audio until we begin.

SPE International

Automated Well Control Value Proposition

DSATS Presentation

Bryan Atchison – Safe Influx Ltd

Webinars

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System Overview

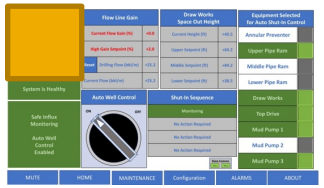
Overall Philosophy

- Uses existing rig monitoring equipment as input for Influx Detection
- Interfaces with, and controls, existing rig drilling equipment
- Existing Rig Safety Systems remain fully functional
- Can be installed on both Conventional and Cyber based Drilling Systems
- Efficient installation process minimizing impact on operations

System Design

- Small Footprint (PLC Cabinet and HMI Screen)
- Easy Interface with Existing Drilling Controls Systems
- Interface arrangements to stay in place for future re-instatement

PLC Cabinet

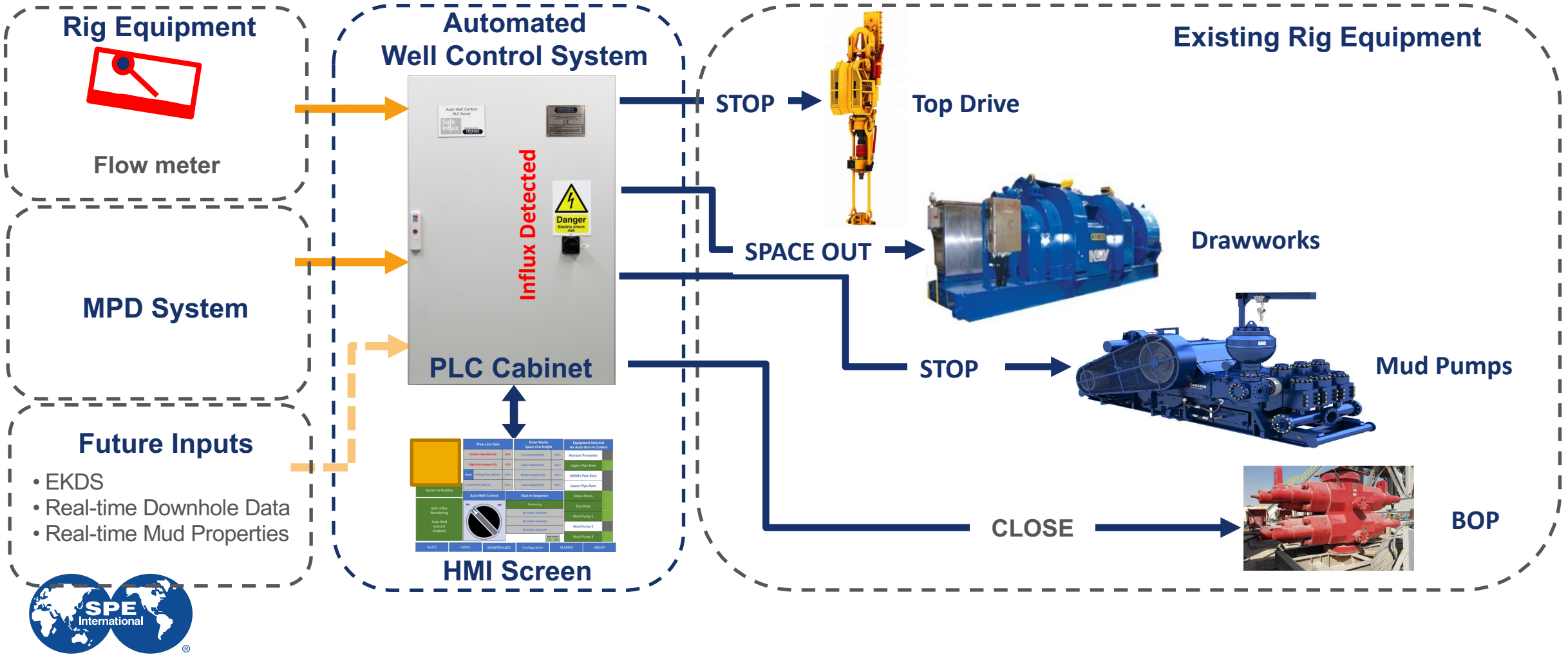


HMI Screen

System Installation

- Rig Survey 2 Persons for 2-3 days (no impact on Operations)
- Design / Fabrication 3-4 months (driven by PLC supply)
- Installation / Commissioning 2 Persons for 2-4 days (limited impact on operations, most can be done off-line)
- Training 1/2-day (Driller, Tool Pusher, AD as a minimum)

System Topology



Product Assurance

Design & Manufacture

- High quality Components
- International Electrical Standards
- Safety Integrity Level 2
- Elevated Mean Time between Failure

System Testing

- Simulator Testing
- Conventional Rig Field Trail
- MPD Integration Field Trial
- Cyber Control System Integration Field Trial

System Verification

- Independent Technology Qualification Process
- API 16D Conformance
- API 16H Compliance

System Documentation

- UK Patent Granted
- US, EP, AU, CA Patent pending
- Technology Readiness Level (TRL) 8

Why Automated Well Control?

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Drillers' loss of Level 1 Situational Awareness (loss of attention) causes **up to 67% of blowouts.**

Loss of Well Control frequency is **6.04 wells/1000** for exploration wells in US Gulf of Mexico.

71% of Well Control Incidents caused by Human Factors.

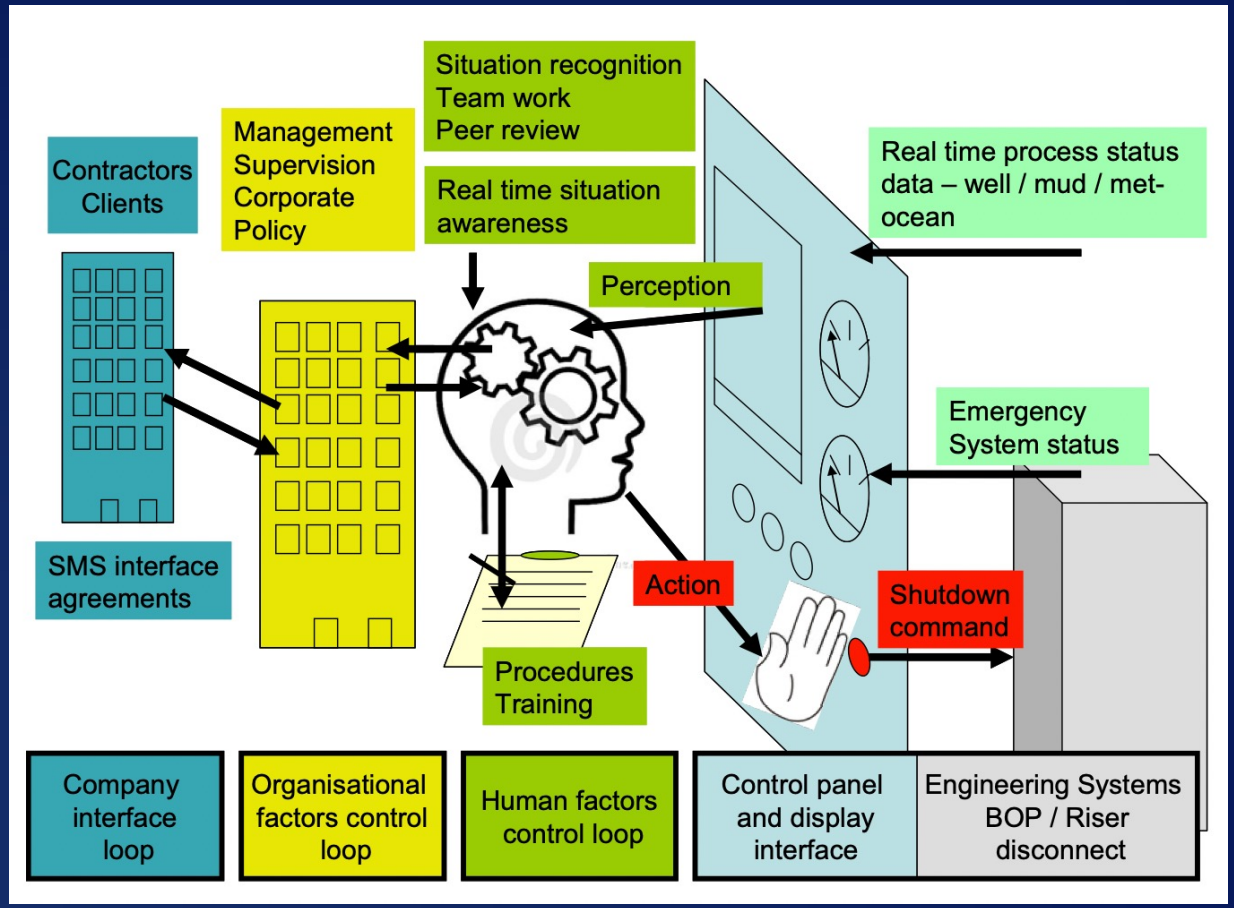
Loss of Well Control frequency is **1.50 wells/1000** for exploration wells in a North Sea Standard operation.

The triggering causes of 54% of kicks could be mitigated or prevented by EKDS and automated response.

Petroleum Safety Authority Norway

Why Automated Well Control?

Key Control Loops



Source: Multi-National Audit "Human and Organisational Factors in Well Control" (North Sea Offshore Authorities Forum 2012-2013)

ABS and Dynamic Stability Control

- Automated Braking Feature.
- Allowing the driver to maintain more control over the vehicle.
- Maintains Stability, avoid hazards and improves safety.
- ABS is required on all new passenger cars sold in the EU since 2004.

Reduction in Influx Volume

Human

- Influx Taken
- Trigger Volume Reached
  Typically 5 bbls or +10% flow increase
  Common value is 10-15 bbls
- Driller Reaction
  Verify indicators
- Space out
- Shut down
  Rotation & pumps
- Activate BOP control
- BOP Closure
  30 Sec – Ram preventer
  45 Sec – Annular Preventer
- Well Closed In

INFLUX SIZE

Reduced Influx Volume

- Faster Recovery Time
- Minimise wear and tear
- Minimises Pressures

Human Factors

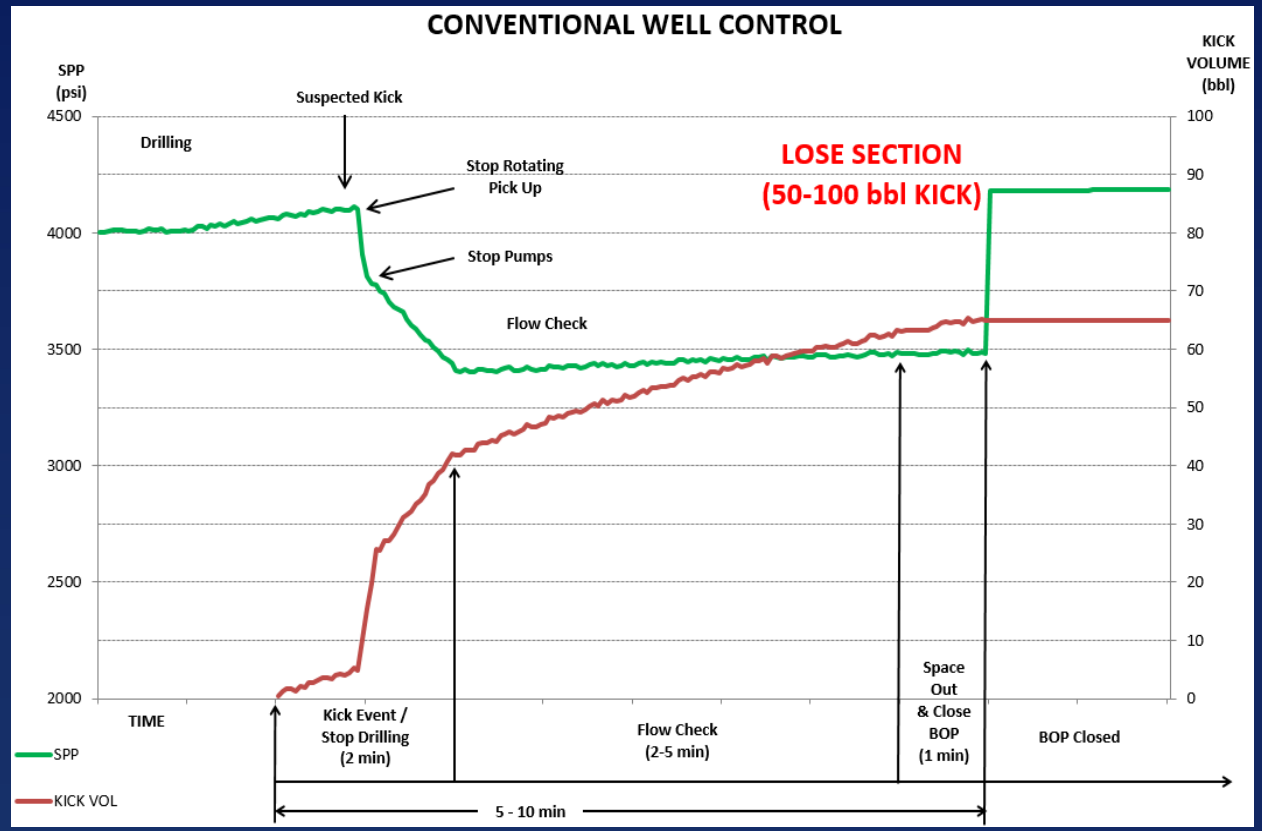
- Additional Focus
- Reduce Human Error

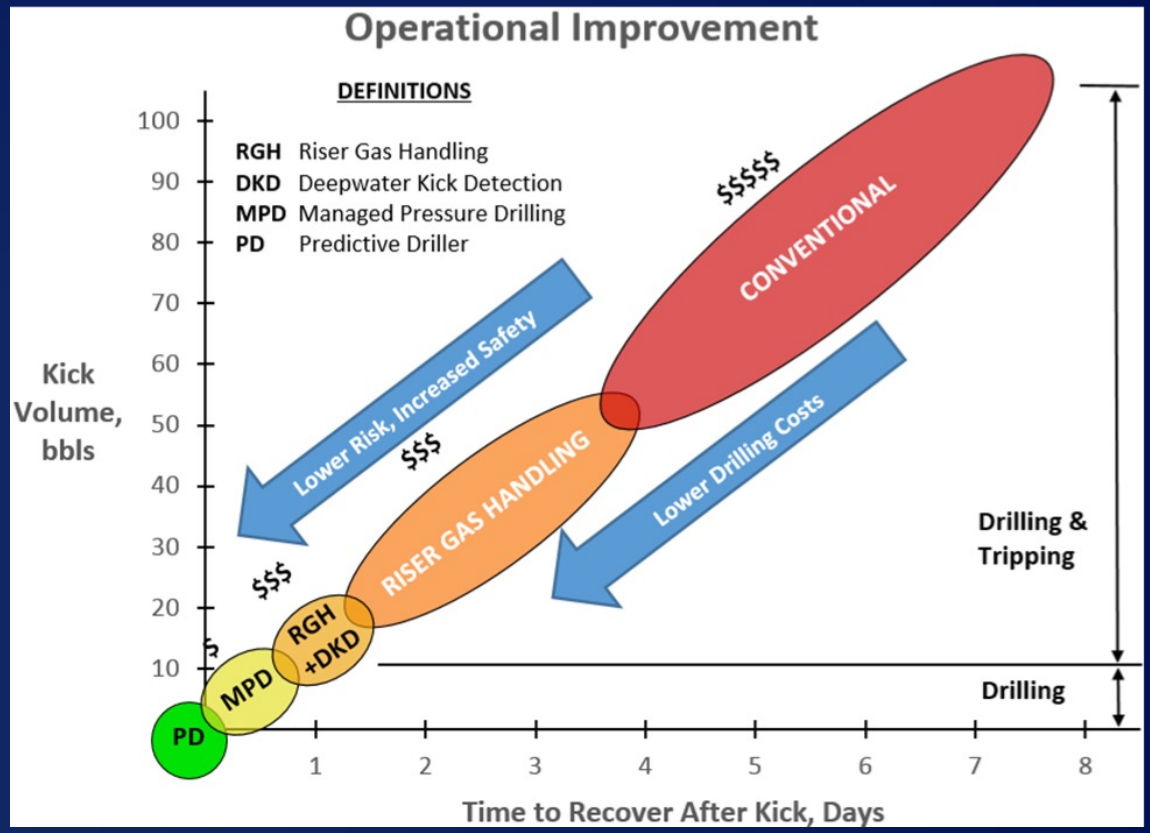
Automated

- Influx Taken
- Trigger Volume Reached
  Typically 5 bbls or +10% flow increase
  (pre-agreed)
- Space out
- Shut down
  Rotation & pumps
- Activate BOP control
- BOP Closure
  30 Sec – Ram preventer
  45 Sec – Annular Preventer
- Well Closed In

INFLUX SIZE

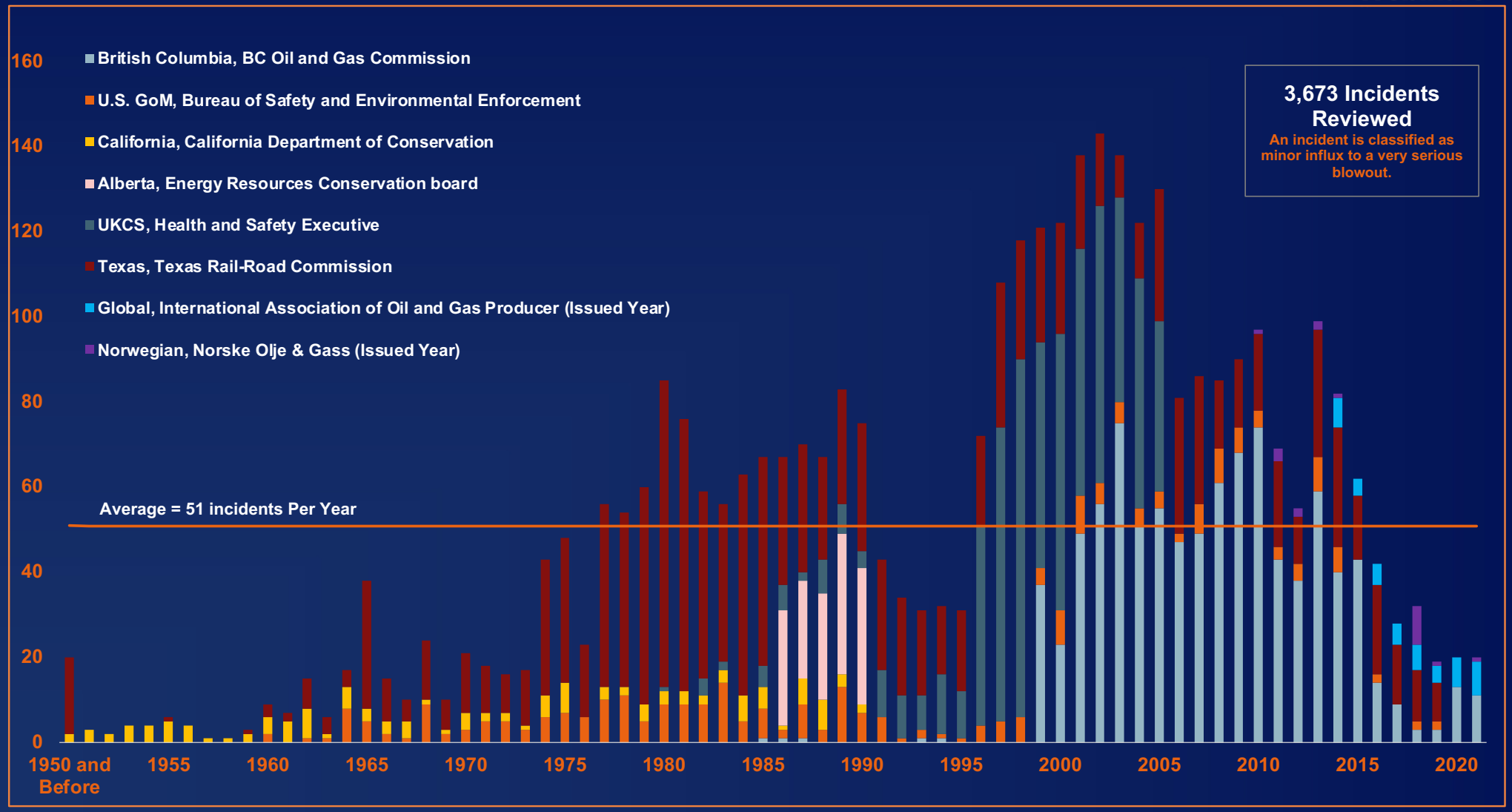
Operational Efficiency



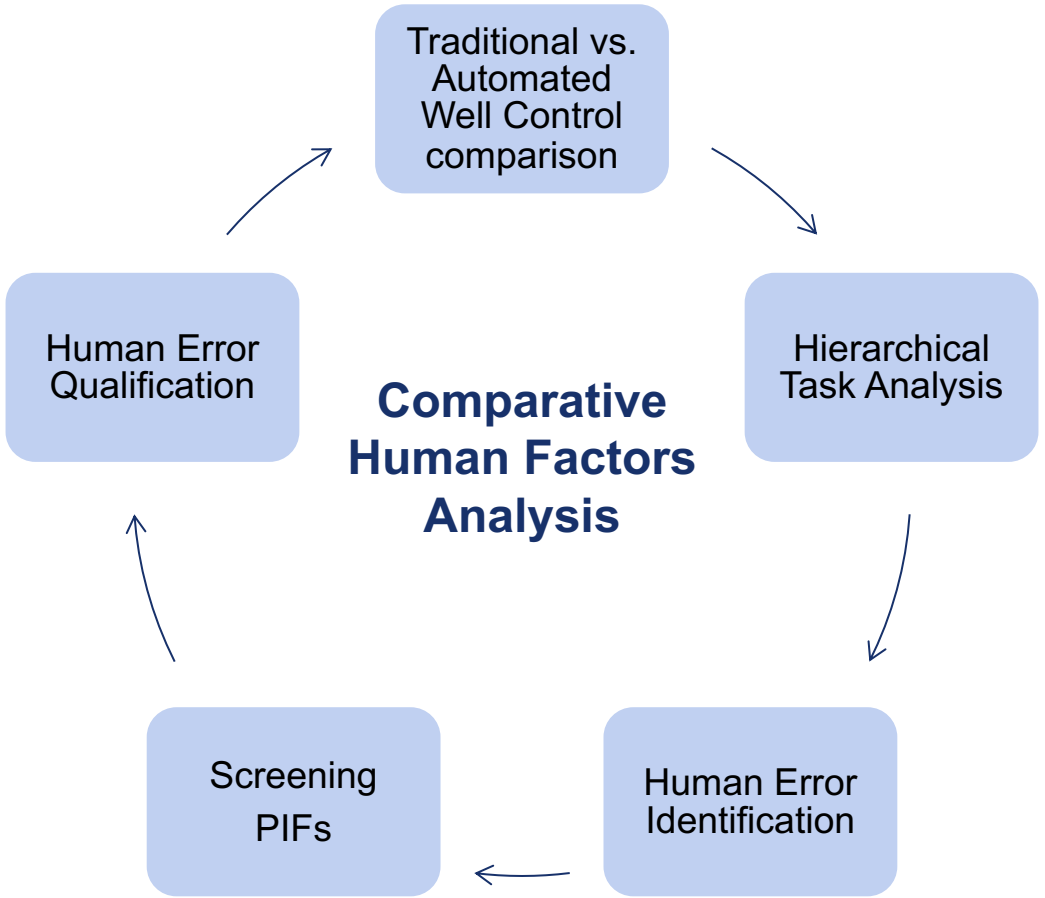


Source: SPE 167990

Well Control Incidents Timeline



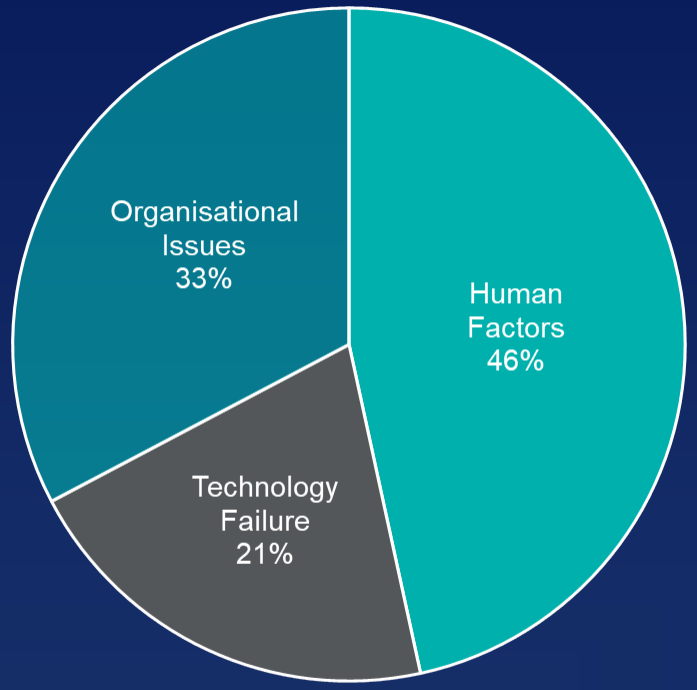
Comparative Human Factors Analysis

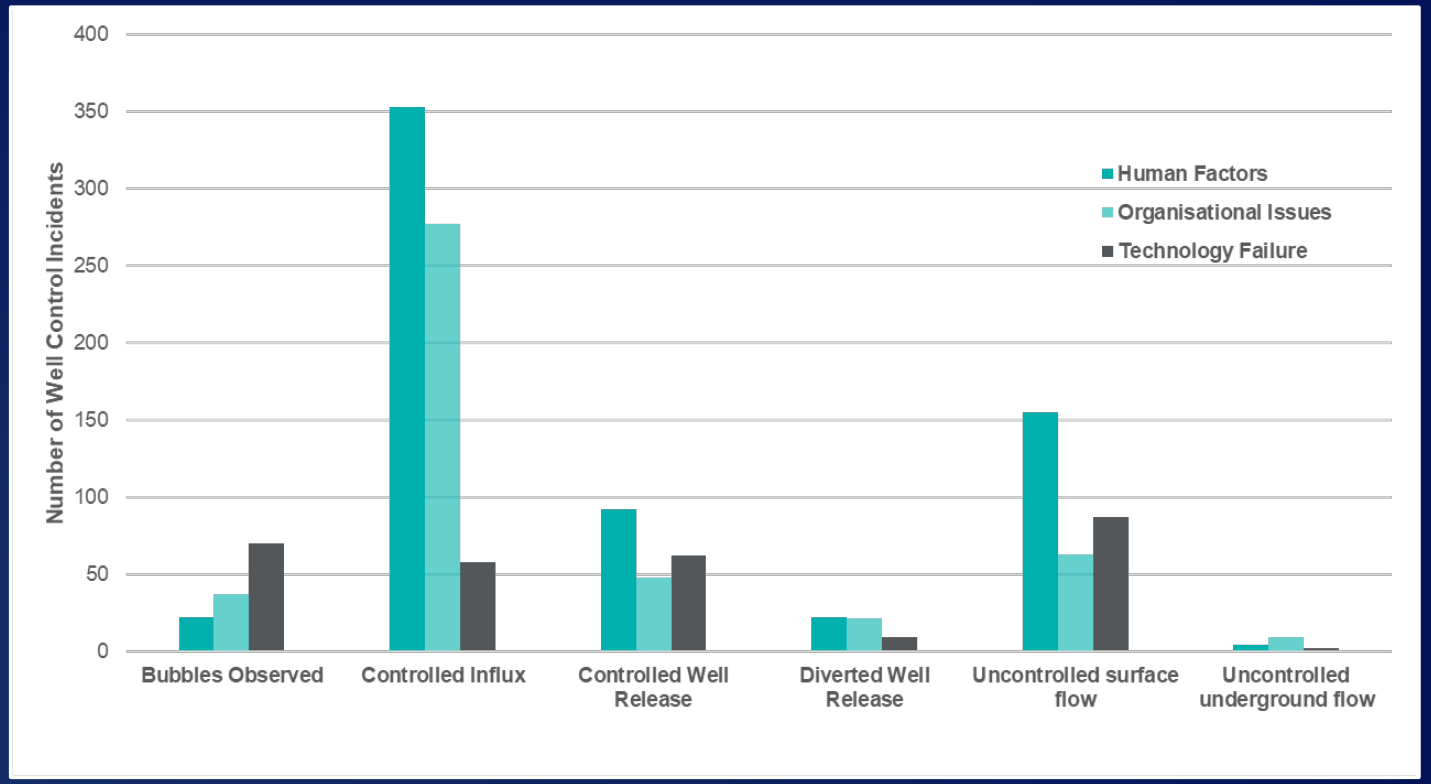


94%

Reduction in Probability of Human Error

Contributing Factors to an Influx



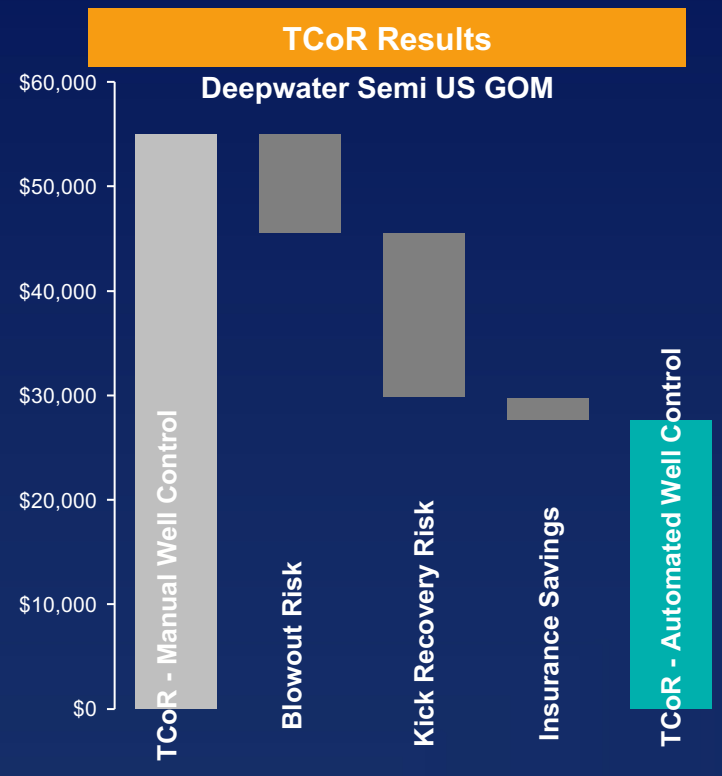


79% of incidents fall into categories that are influenced by human behaviour. Over 10% of these incidents escalate into uncontrolled events

Total Cost of Risk- Well Control

Input Data:	
COST INFORMATION	
Spread Rate (Time dependent Costs) $k/day	500
Insurance Cost as percentage of Asset	2.0%
Insurance saving using Safe Influx	10%
Average number of wells drilled/year	4
BLOWOUTS	
Blowouts /1000 wells	4
Blowouts that lead to Damage /Total Loss	See Note
Total Loss: Rig Value $M	400
Non Total Loss: Repairable Damage $M	200
Damage to Reputation: Total Loss $M	400
Damage to Reputation: Repairable Damage $M	200
KICKS	
Kicks /well	0.6
Days for Kick Recovery per incident	6
Kick Recovery Time:Safe Influx vs Manual	20%
ENVIRONMENTAL SPILLS	
Chance of Medium Spill per Blowout	0.016
Chance of Major Spill per Blowout	0.056
Cost to clean up Spill $M	5000
LOSS OF LIFE	
Chance of loss of life per blowout	0.400
Cost of life lost $M	10
HUMAN FACTORS	
Human Factors reduction %	70%

Reduction in Risk



Reduced Risked Costs

- Reduced Insurance Exposure
- Reduced Risk/Cost of Blowout
- Reduced Kick Recovery Time

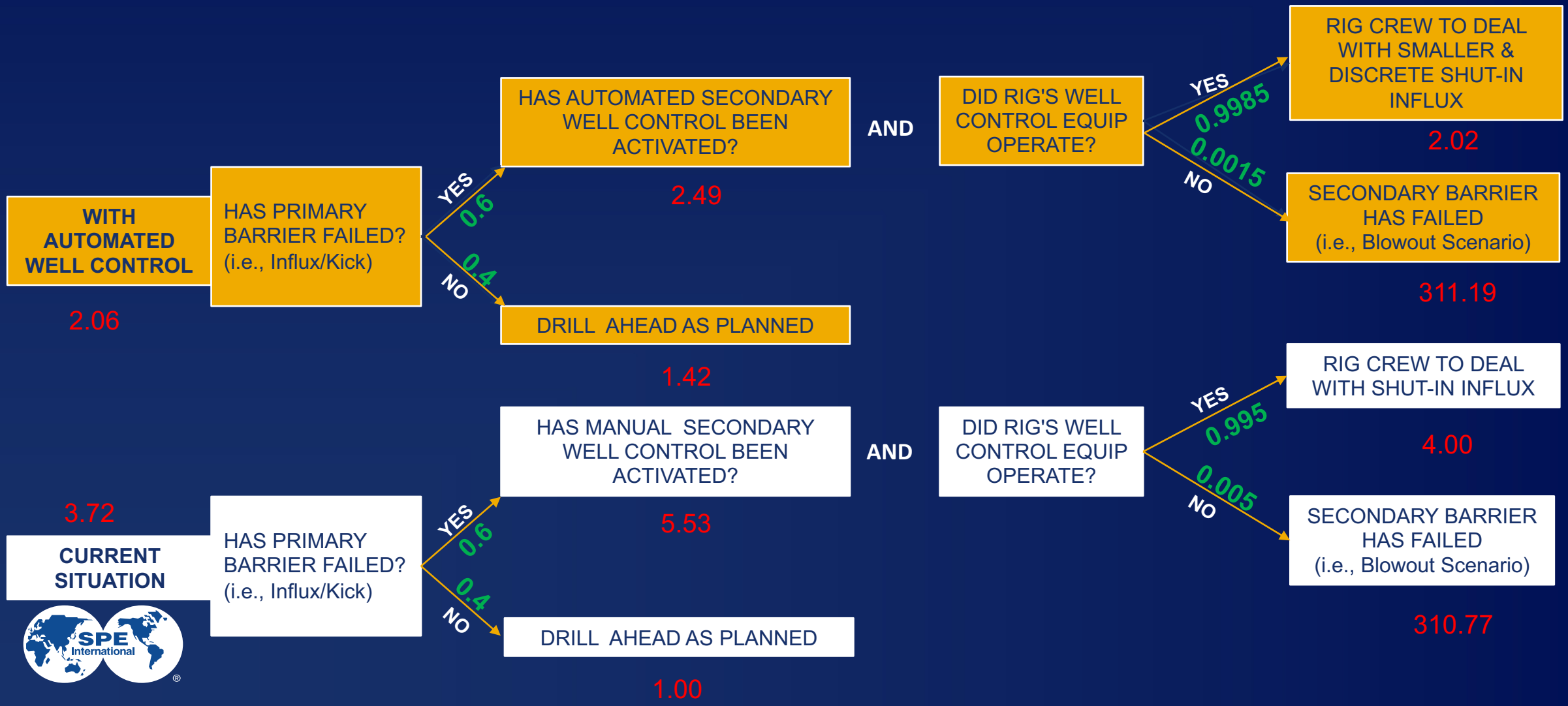
Key Points

Cost of Risk often not articulated in well AFE

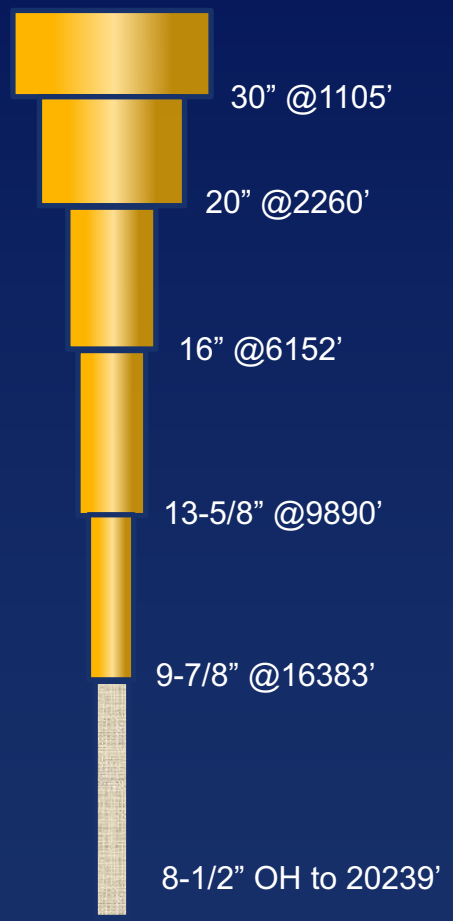
Potential for up to **50% Risk Cost Savings** per well with Automated Well Control

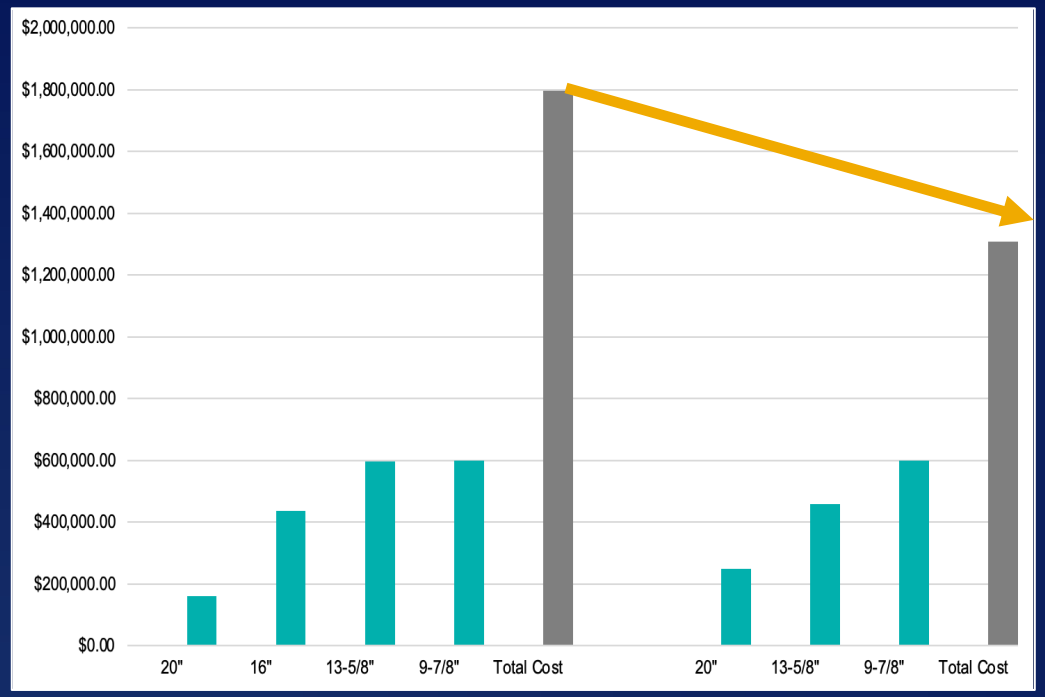
TCoR Model could include NPV of deferred / lost production

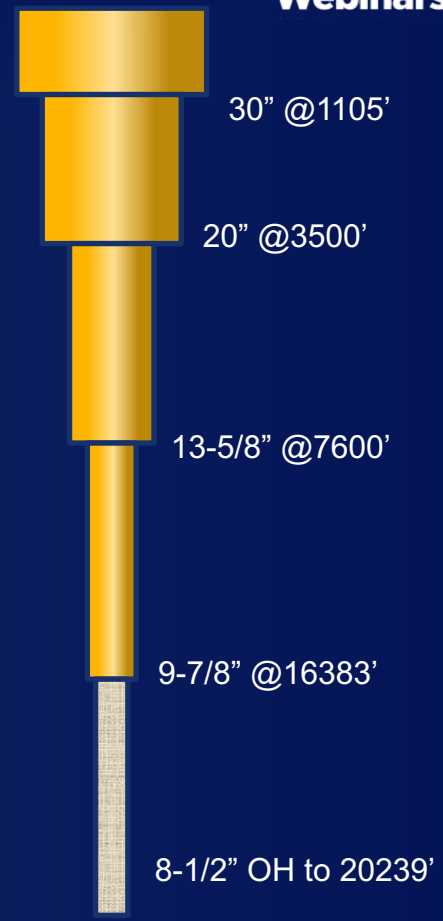
TCOR – Well Control Events – Per Well



Optimize Well Design







Influx Volume	• Reduced Volume • Consistent & Repeatable
Pressures	• Reduced Well Pressures • Reduced Surface Pressure
Casing Design	• Reduction in Kick Tolerance

How to reduce risk with Automated Well Control?

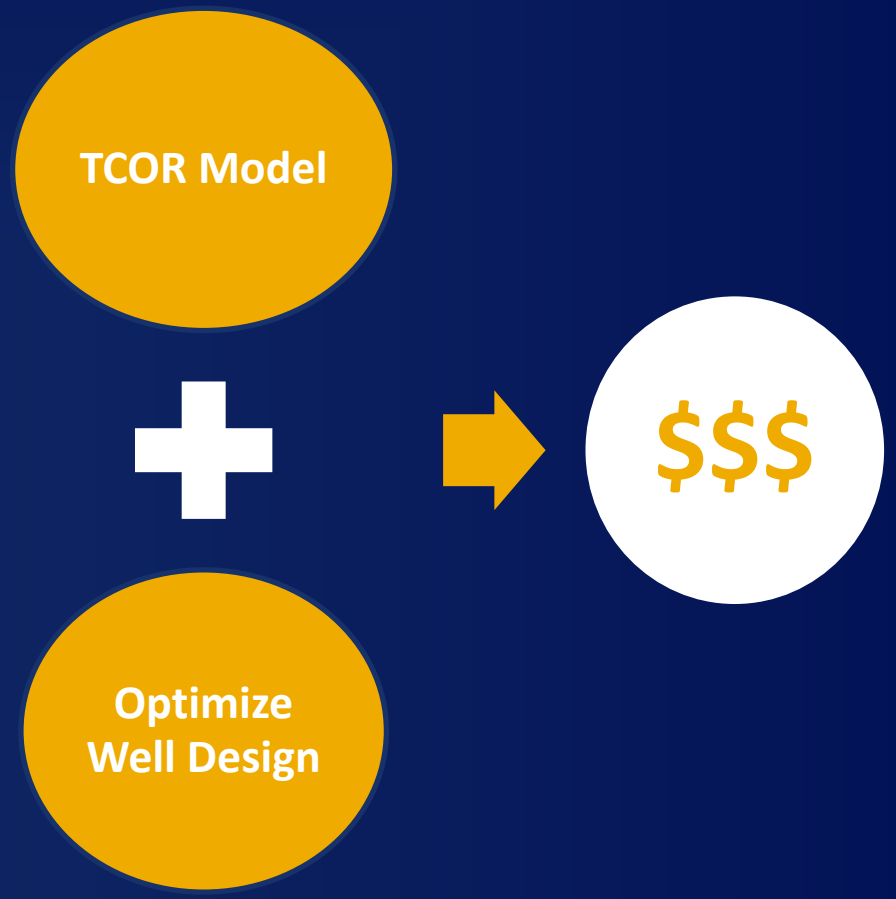
Webinars

Reduced Well Control Risks

Reduction in probability of human error.
Robust decision-making, efficiency and safety

Cost Effective Wells

Reduced influx volumes.
Reduced Total Cost of Risk for well control.
Reduced well construction cost.



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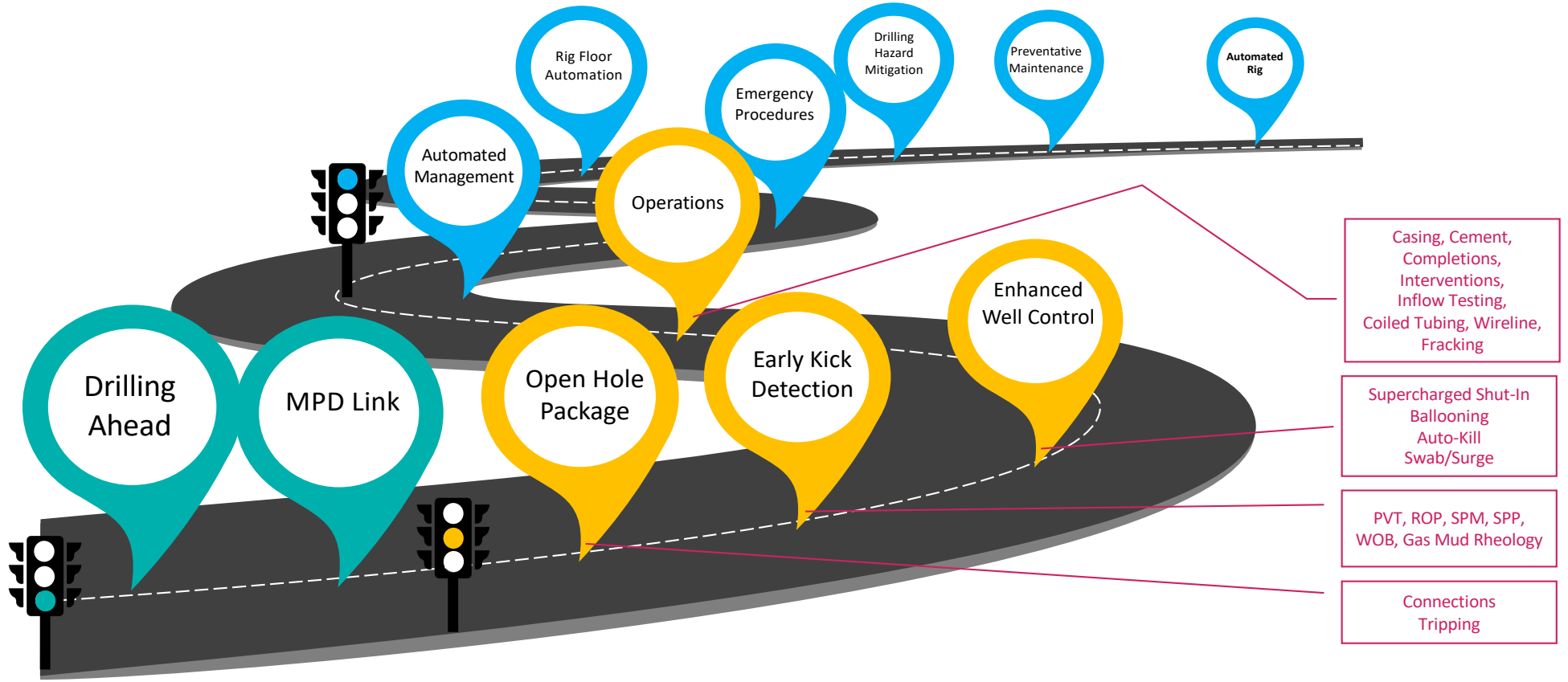
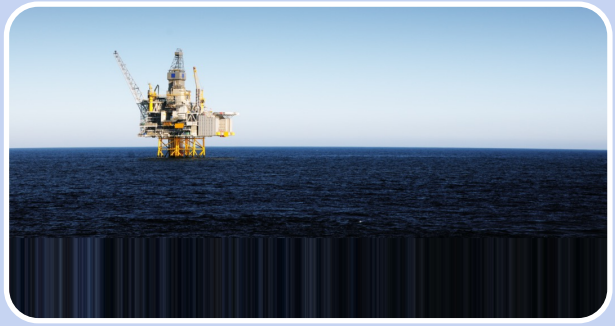
The Journey Ahead



Environmental Gains towards Net Zero



NET ZERO

Large reduction in blowouts and environmental spills

Reduction in carbon footprint and greenhouse gas - faster recovery from (smaller) kicks

Potential for more efficient well designs and smaller carbon footprint, up to 20% less

Summary

Reduced Well Control Risks

Reduction in probability of human error by 94%

Robust decision-making, efficiency and safety

Environmental Performance

Reduced spills

Reduced carbon footprint

Cost Effective Wells

Reduced influx volumes

Reduced Total Cost of Risk for well control by 50%

Reduced well construction costs by 20%

Conclusions

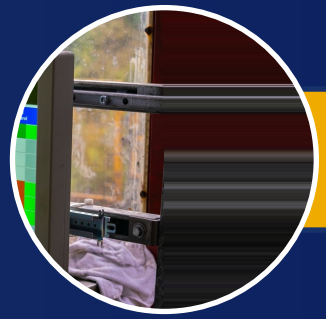
Five times faster = cost effective wells

Driller-assist tool – no extra personnel

All kicks in all wells safely detected and managed

De-scoping well design

Simple and short rig installation process



Well control assurance

Q&A

Safe Influx Automated Well Control

Protection against blowouts

Risk and cost reduction

Peace of mind

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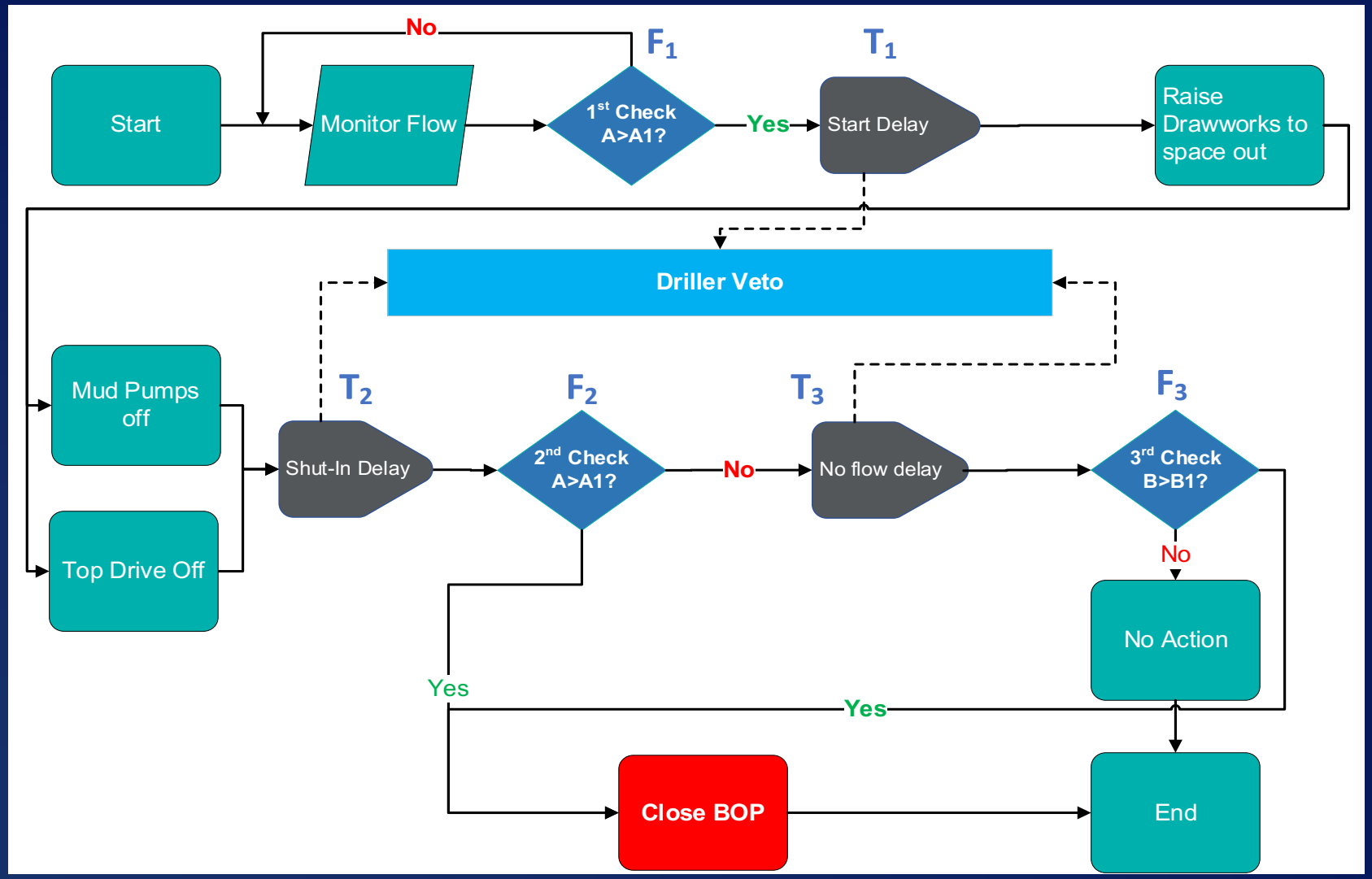
False Positives Filters



Drillers HMI