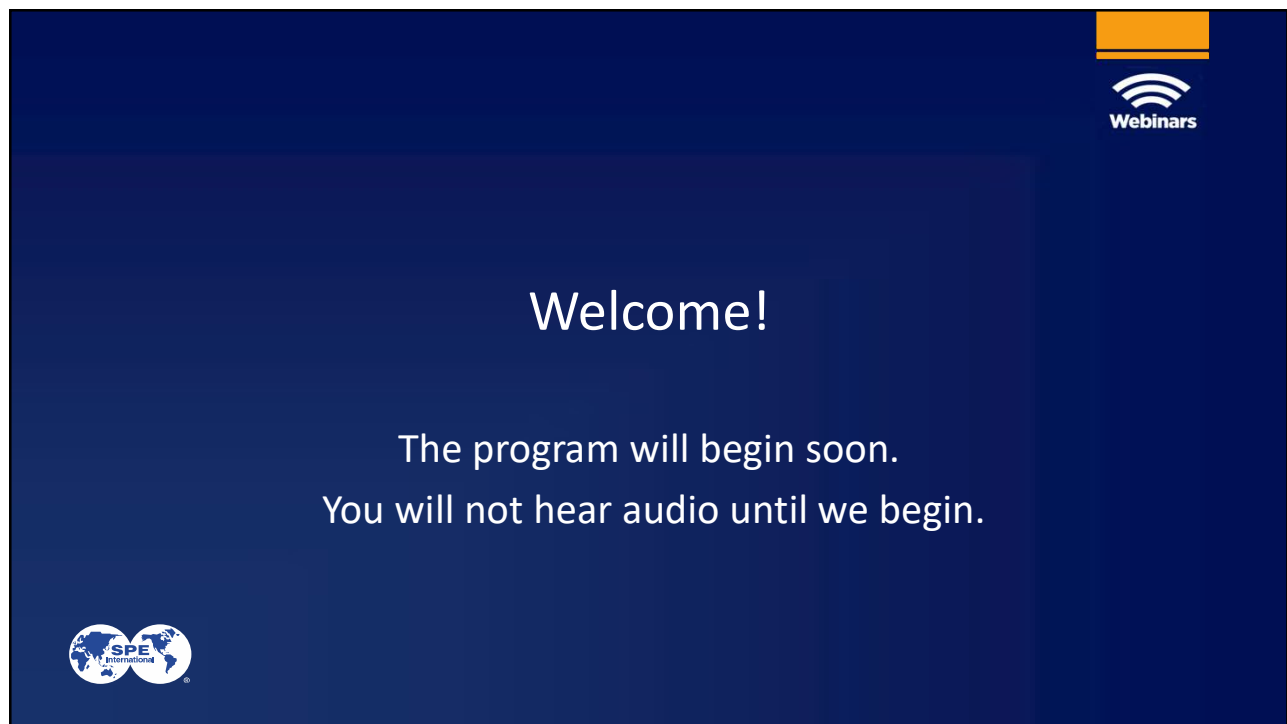




A dark blue rectangular slide with a white border. In the top right corner, there is an orange square above a white Wi-Fi symbol and the word "Webinars". In the center, the word "Welcome!" is written in large white font. Below it, two lines of white text read: "The program will begin soon." and "You will not hear audio until we begin." In the bottom left corner, there is a white logo for SPE International, which consists of two globes and the text "SPE International".

Webinars

Welcome!

The program will begin soon.
You will not hear audio until we begin.

SPE International



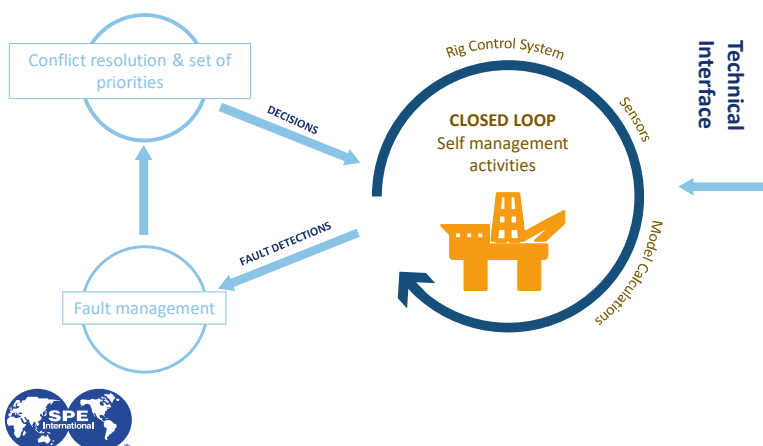
Field proven AI/ML solutions, next step in the automation space?

Serafima Schaefer, PhD
Project Manager at Exeбенus
21st of September 2023





Well construction automation: Finite State Automata



Missing information that needs to be provided:

- Transition of activities
- Configuration
 - Wellbore
 - BHA
 - Formations
- Transition of activities
- Parameters
- Tolerance
- Contingencies

Work Process





Examples: Real Time data for risk awareness and ROP optimization

Stuck pipe risk awareness

INPUT

Bit depth
Hole depth
Hookload
Flow rate
RPM
ROP
Stand-pipe pressure
Mud density in
Trajectory



OUTPUT

Identified Stuck pipe Risk
Identified Hole Cleaning Risk

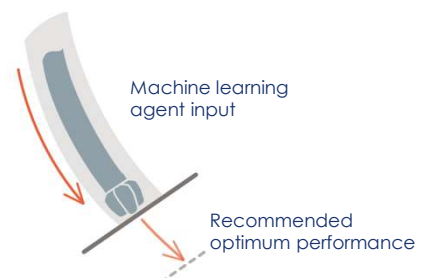


Classification models

ROP optimization

INPUT

Bit depth
Hole depth
Surface RPM
Surface torque
Weight-on-bit
Standpipe pressure
Flow rate
Mud density in
Trajectory



OUTPUT

Predicted Optimum ROP
Recommended Drilling Parameters

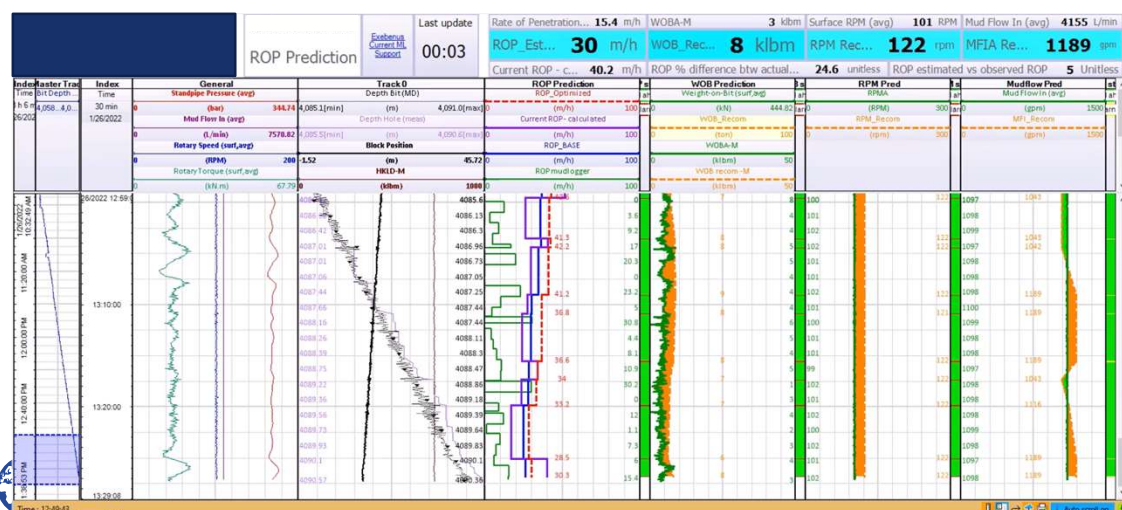
Self-corrective solutions

AI/ML solution warning rig team on Differential Sticking in RT



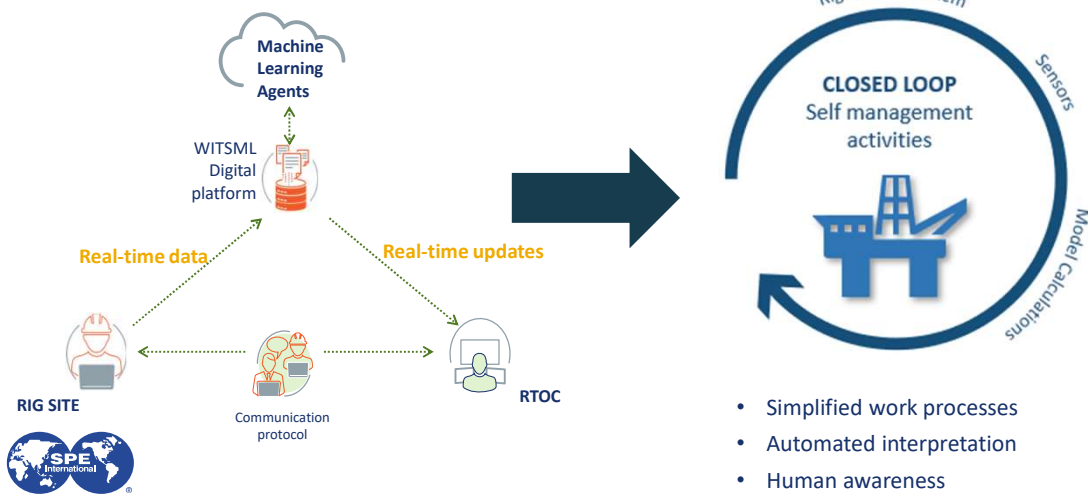
6

AI/ML solution advising rig team on optimal drilling parameters in RT



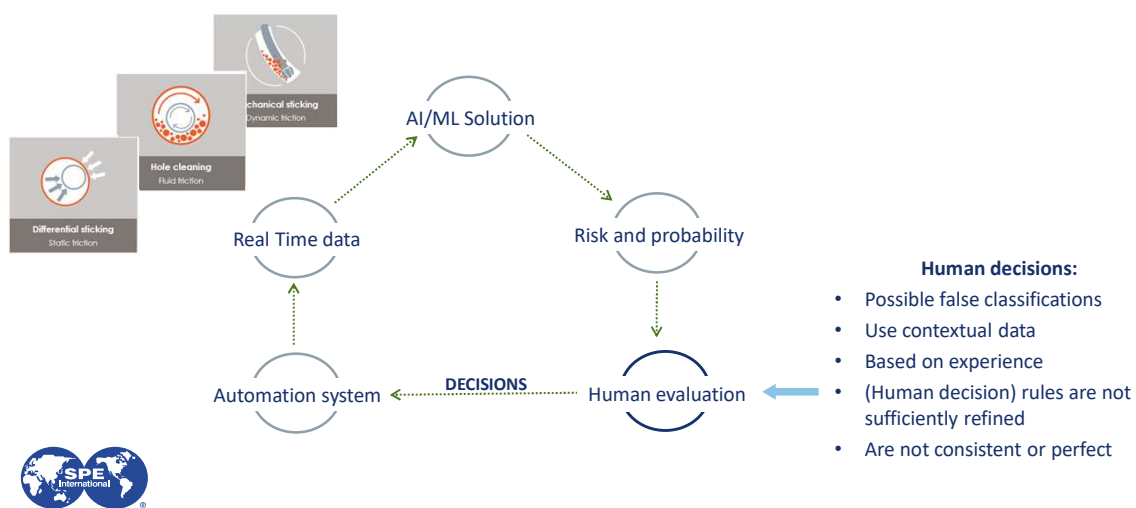
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From RTOC to Automation

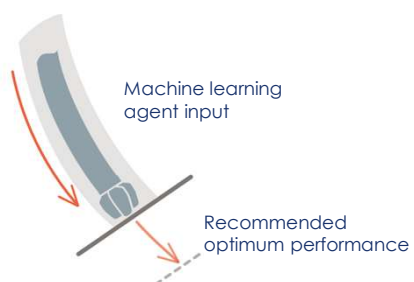


8

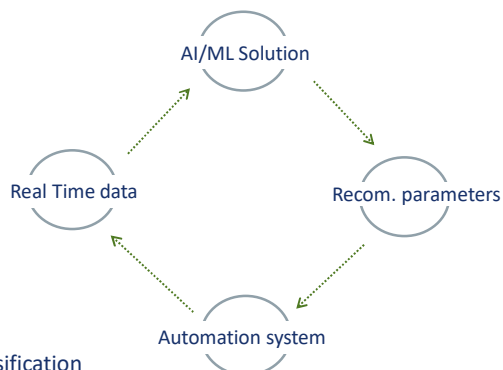
Classification models could take time to automate



Self-corrective solutions are qualified for automation



- Proven in the field
- Trusted by the rig team
- Self-corrective in decisions
- Do not require human evaluation/classification
- Automation state: ready for trial



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Conclusions



- Targeted AI/ML solutions have been a valuable tool for rig operations
- Current implementation of AI/ML solutions has proven itself in the field and could be used for drilling automation
- Classification AI/ML models require human interaction and therefore are not fully qualified for automation yet
- Self-corrective AI/ML solutions, such as ROP optimization, are more qualified for automation than classification models





Thank you

If you have any questions, please contact me at serafima@exeбенus.com

