

Automation for Safer and Faster Drilling

Shell in the World



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Organizational Value: Automation and Safety

“Goal Zero” with current technology is achievable....



Serious Incidents:

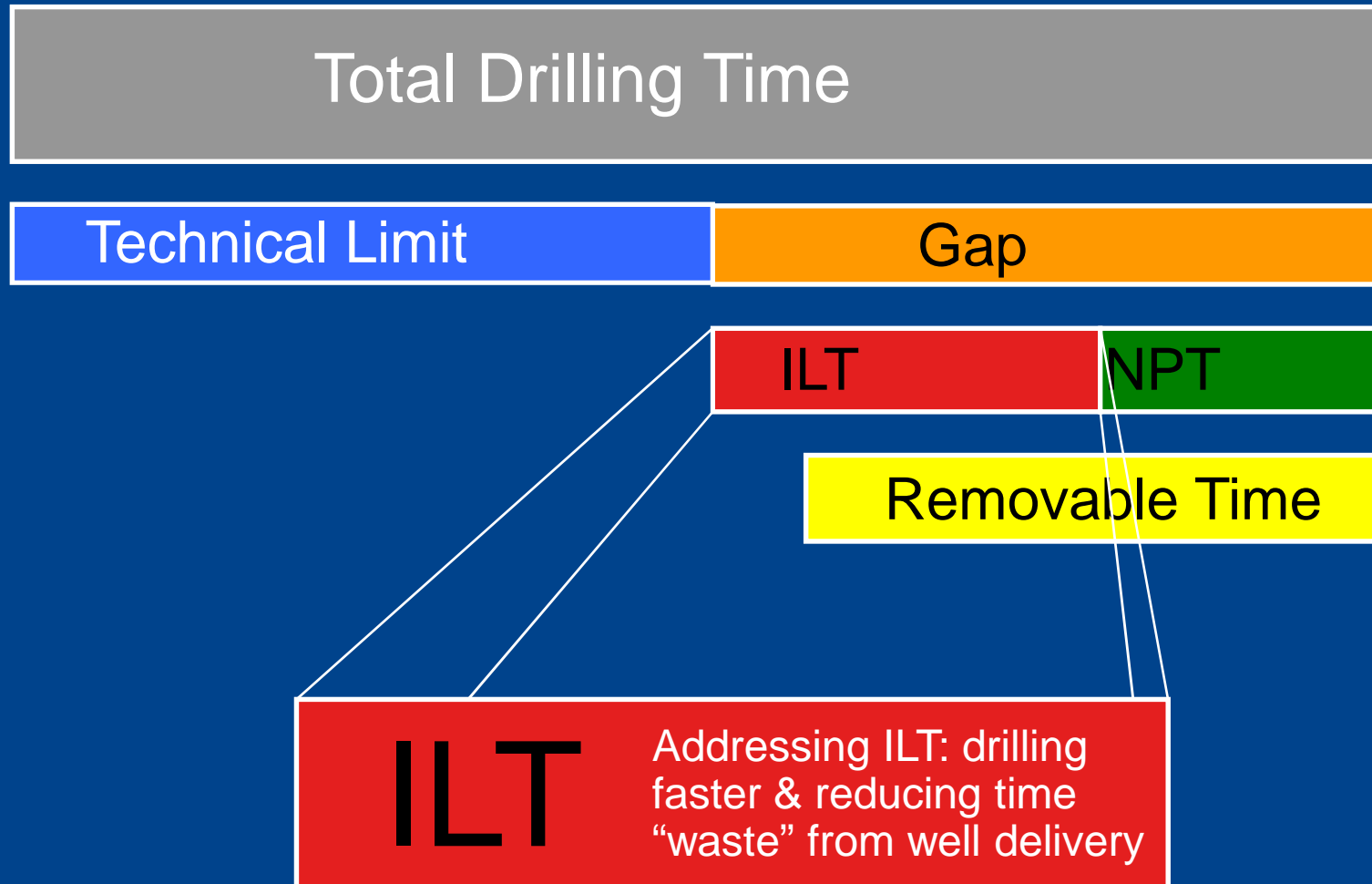
- ✓ Dropped Objects
- ✓ Pressurized/Energized Equipment
- ✓ Falls from Height
- ✓ Road Transport
- ✓ Fitness to Work

Less Serious Incidents:

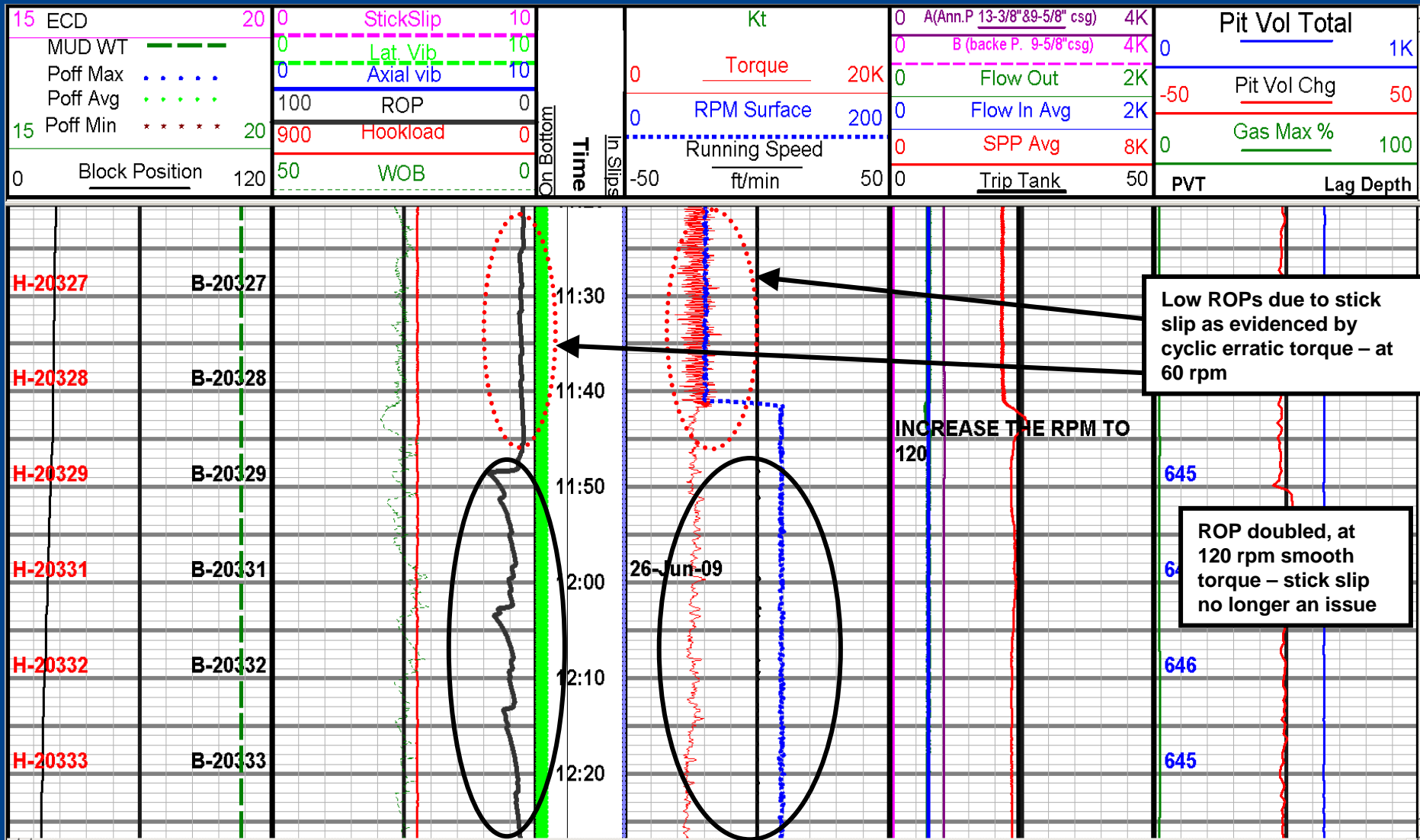
- ✓ Slips/Trips/Falls
- ✓ Hand Positions, etc.

...but automation will help reduce human exposure and associated risks

Business Value: Tackling Invisible Lost Time



Drilling Efficiency Optimization (DEO)

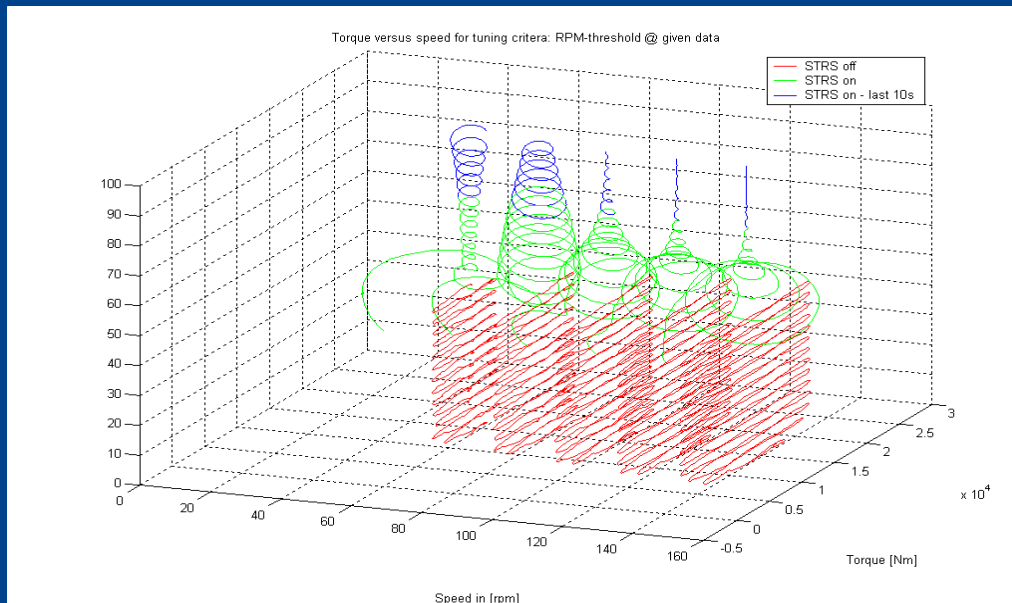
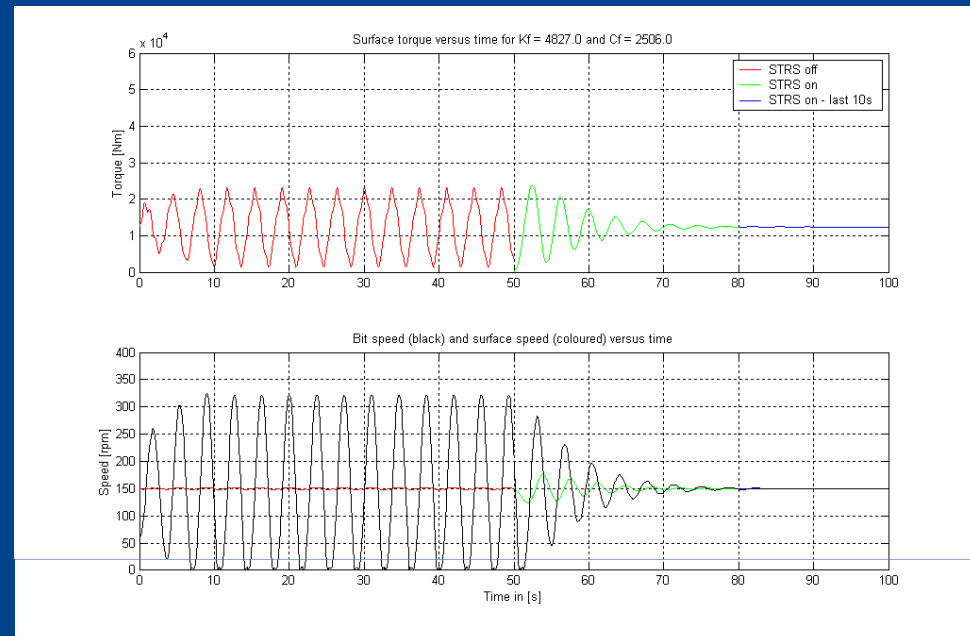


DEO currently achieved through human interaction, but automation would bring more consistency in finding and maintaining optimum parameters

Drilling Automation – Soft Torque Rotary

STRS Benefits

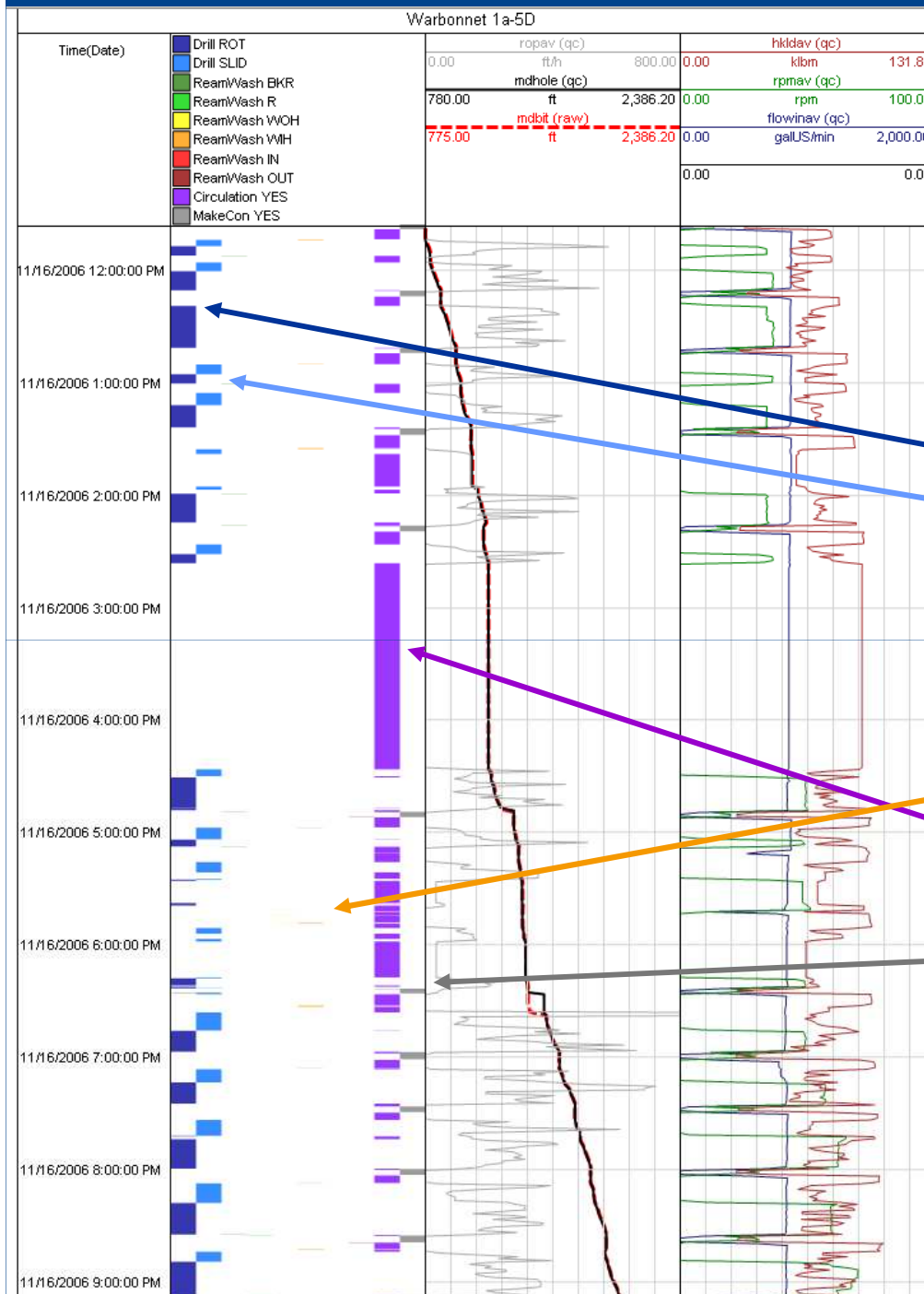
- ✓ Modulates surface RPM and torque to break the pattern of downhole stick-slip vibrations
- ✓ No human (inter-)action necessary (besides calibration)














STRS Developments

- ✓ Top-drive modulation systems developed, trials ongoing
- ✓ Next step: automating drill-off tests to establish optimum drilling parameters

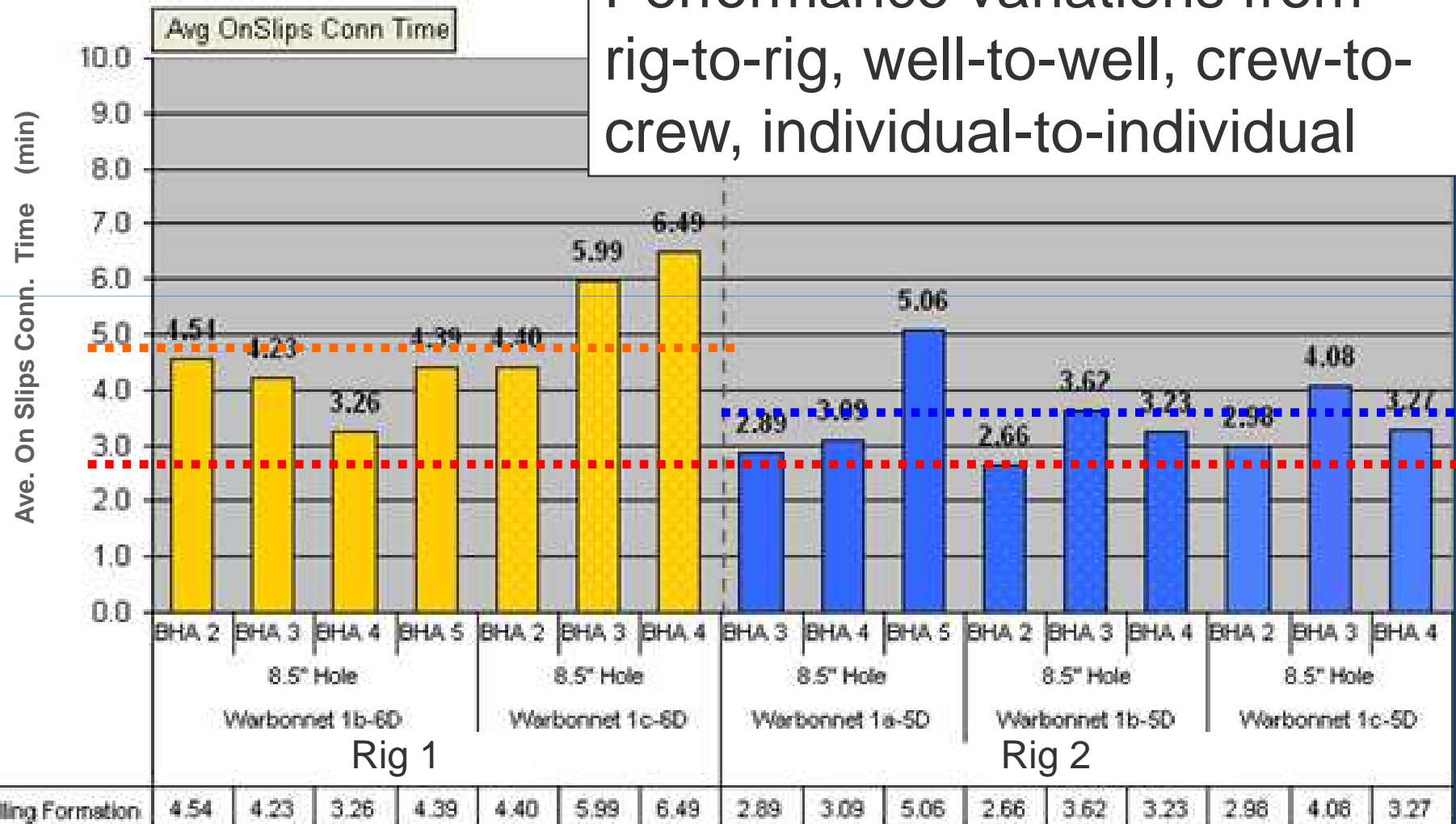
Automatic Rig Activity Detection (ARAD)



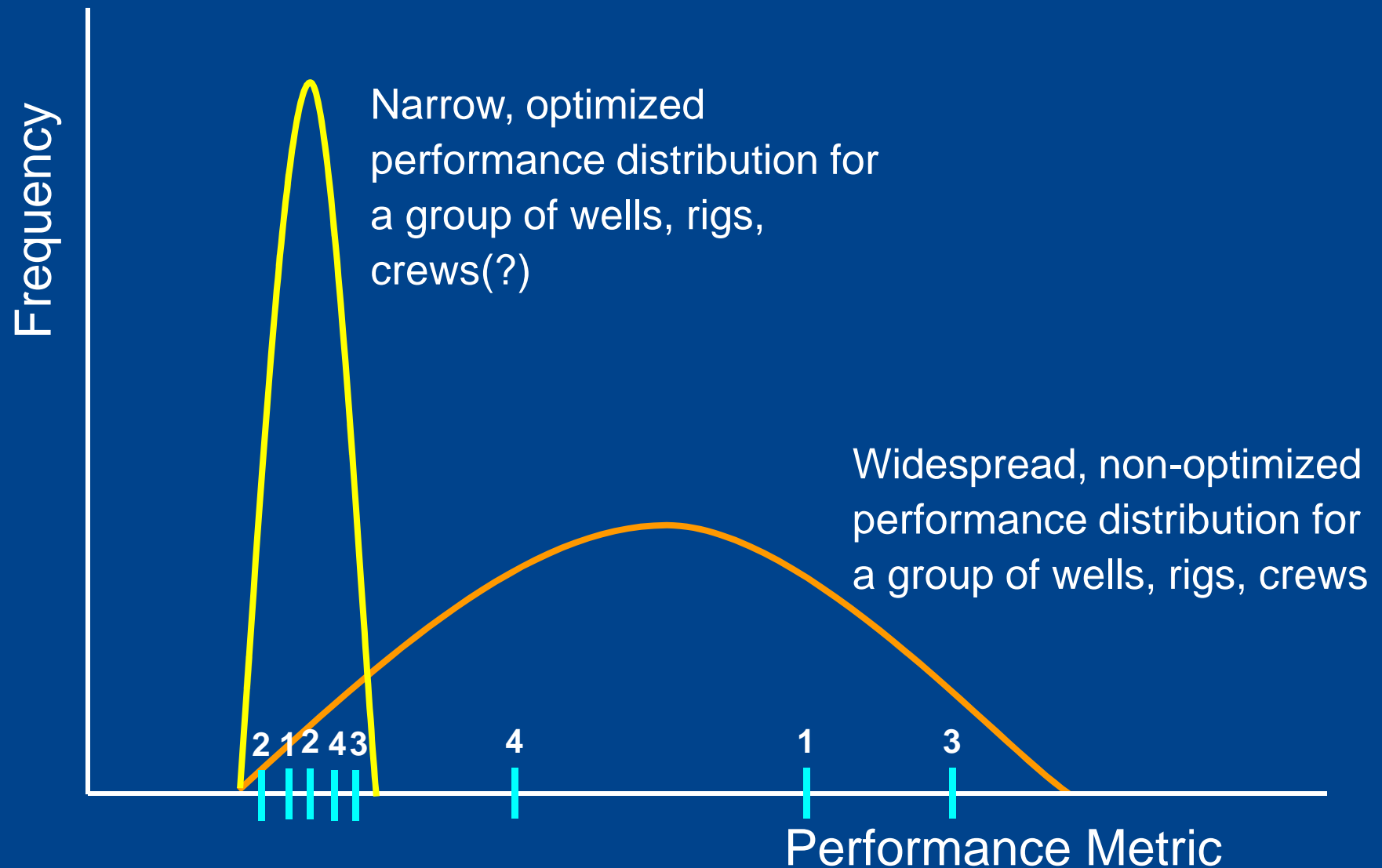
-  Drilling Rotary
-  Drilling Sliding
-  Ream & Wash Up (backreaming)
-  Ream & Wash Down (into hole)
-  Wash Up (out of hole)
-  Wash downwards (into hole)
-  Run Into Hole
-  Run Out of Hole
-  Circulation On
-  Make Connection
-  Other / Unrecognized

Comparing Crews – Connection Time

Performance variations from rig-to-rig, well-to-well, crew-to-crew, individual-to-individual



Optimum Performance Standardization using Automation



Summary

Case for Automation:

- ✓ Improving safety by reducing hazardous exposures
- ✓ Faster drilling, achieved through automated selection and maintaining of optimum drilling parameters (e.g, breaking stick-slip with STRS)
- ✓ Reduction of time “waste” caused by inefficiency and natural variation in human performance

