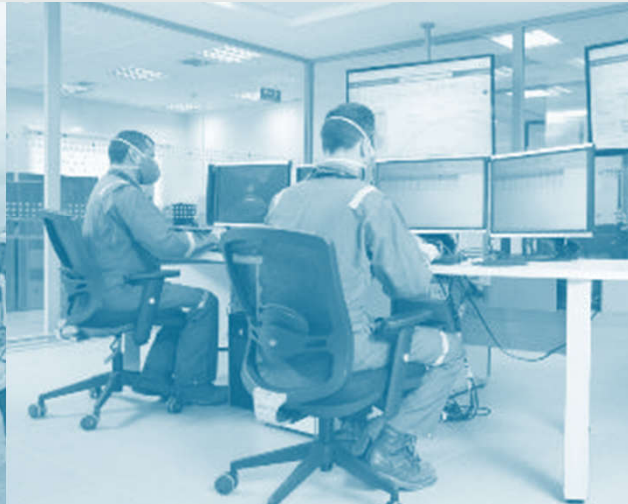


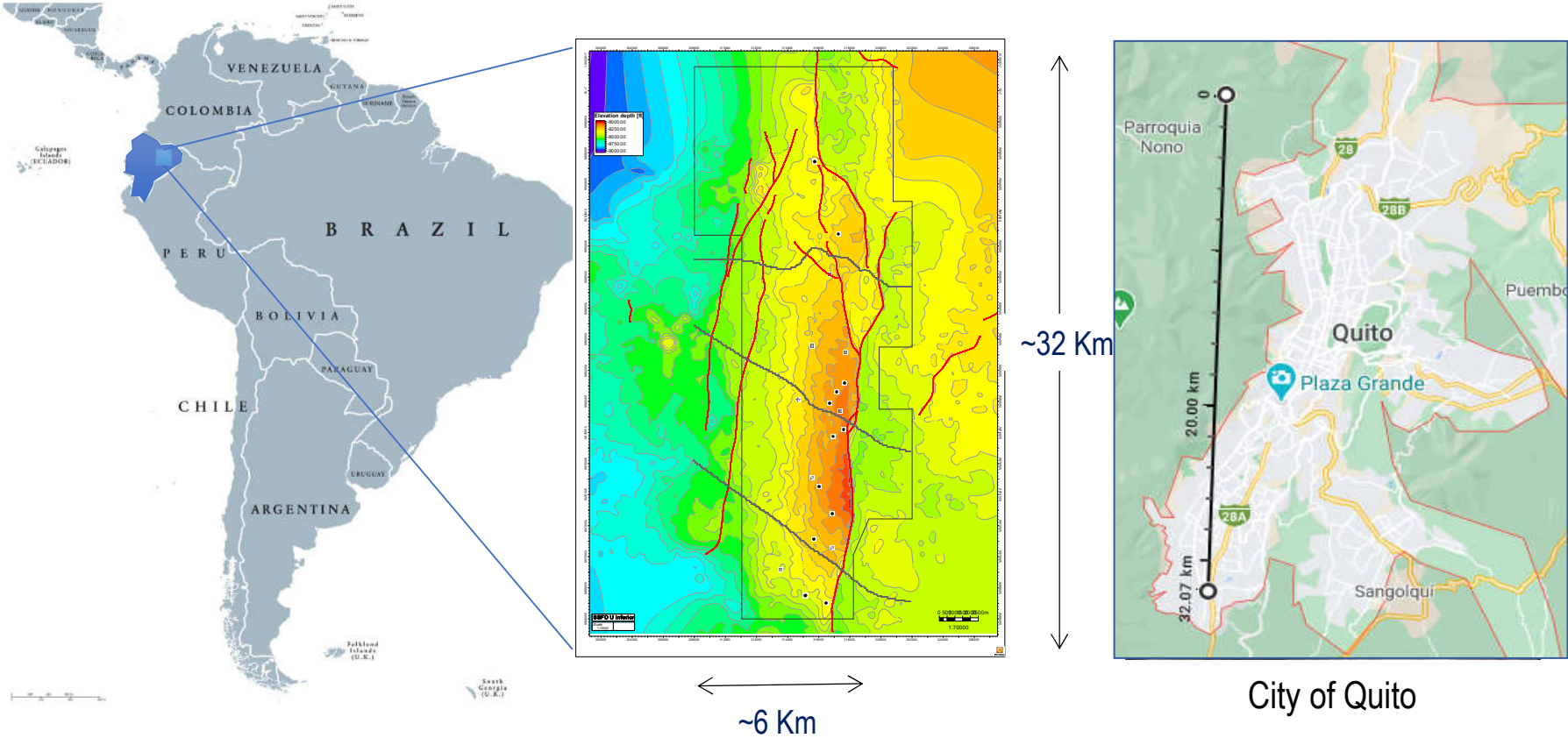


Autonomous Digital Technology Supporting Corrosion and Scale Management

Christian Bonilla - Sep 2022



Shushufindi-Aguarico Field Block 57



- ≈ 50 years Production History
- 5,4 MM Bbls OOIP
- Operated by NOC EP Petroecuador
- Electrical Submersible Pumps (ESP)

Challenges

160 ESPs

61,000
BOPD

245,000
BWPD

40
Platforms

Wells have been over- or under-treated **50%** of the time

>20% failure rate due to corrosion and scale



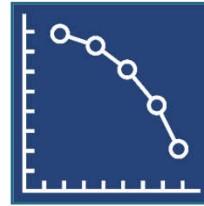
Workover
Costs

\$8 M Annually

\$5.3M Annually

Production
Losses

Chemical Treatment Program



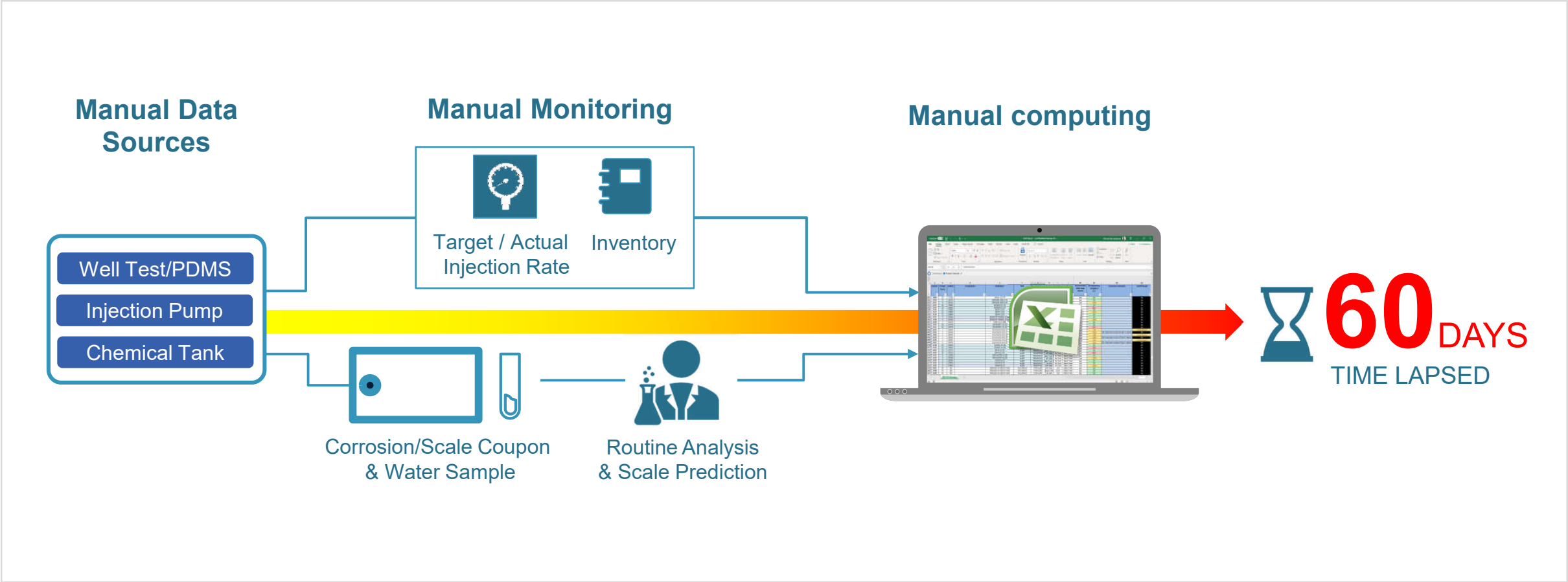
Low level of effectiveness with initial production chemical programs



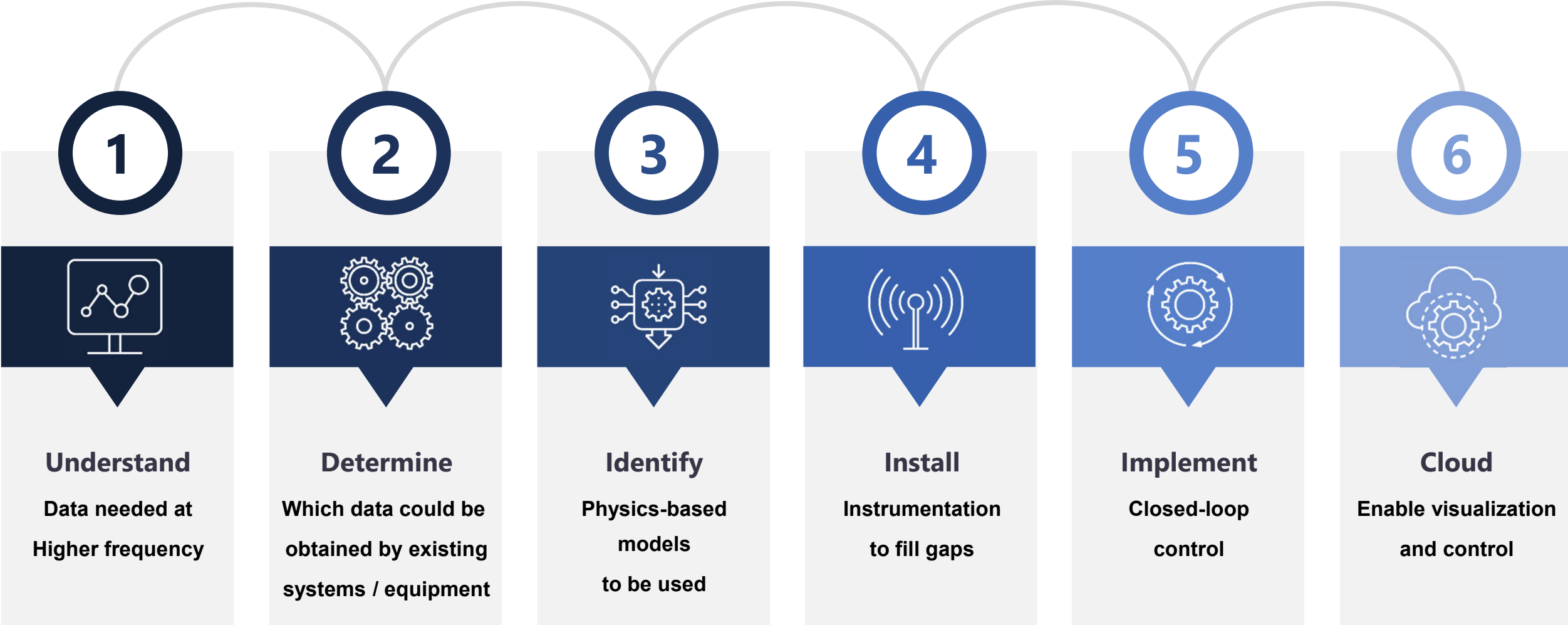
Ineffective production chemical management programs are cited as the root cause of **21% of ESP** failures.

* Kimberlite International Oilfield Research.

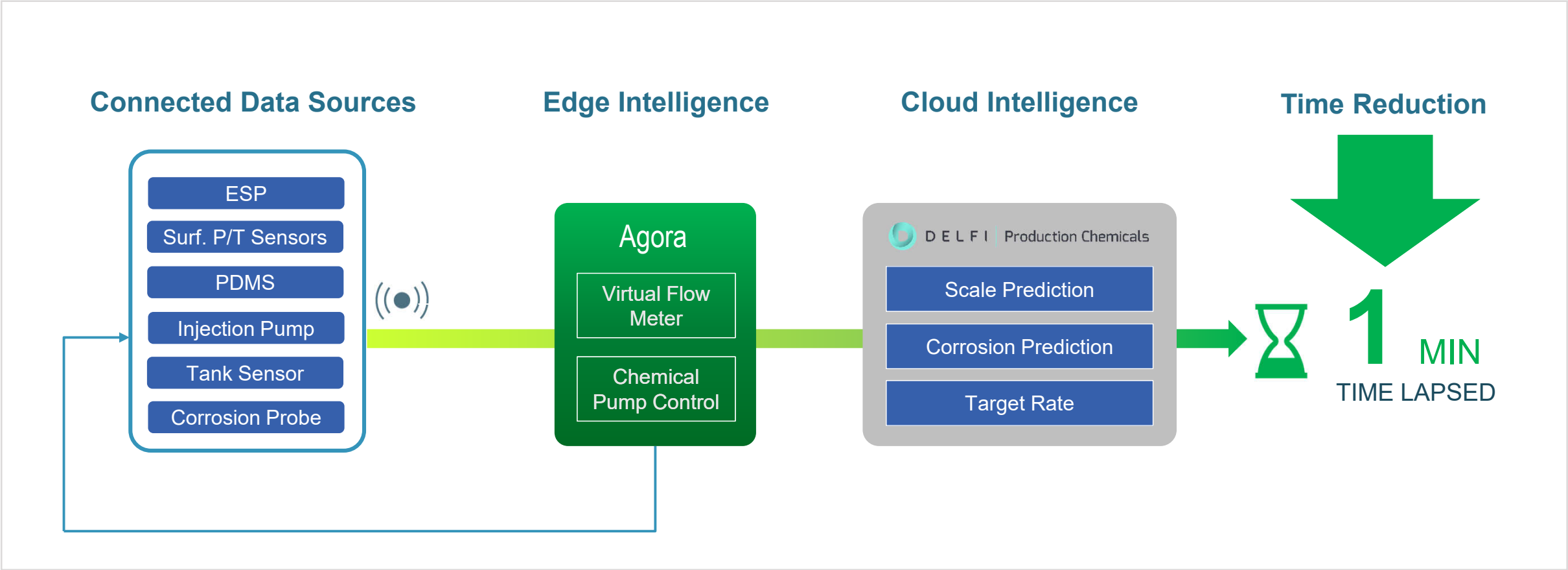
Traditional Monitoring Process



Standardized Digitalization Approach



Optimized Monitoring Process



Automated Advisory System

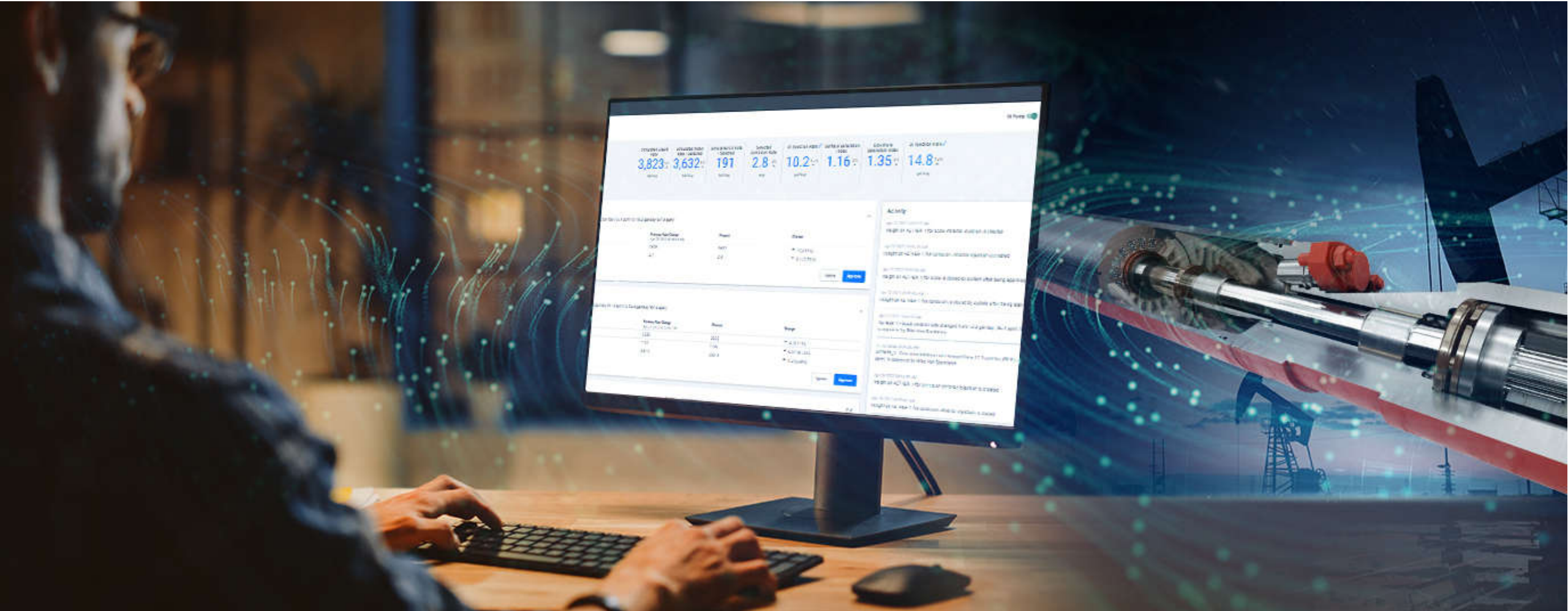


Real-time corrosion and scale risk identification

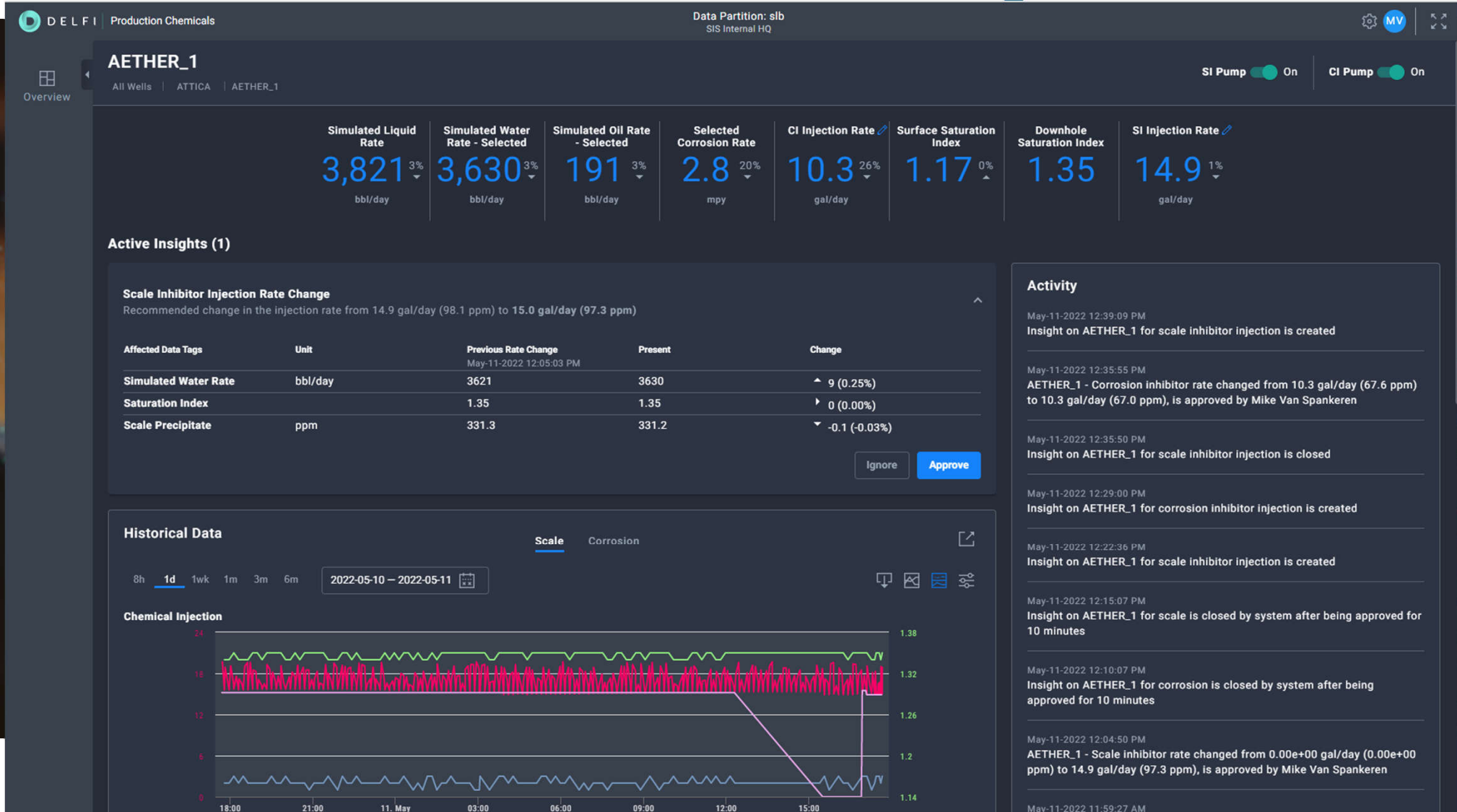
Autonomous chemical injection

Automated generation of actionable insights

Production Real-Time Insights



Production Real-Time Insights



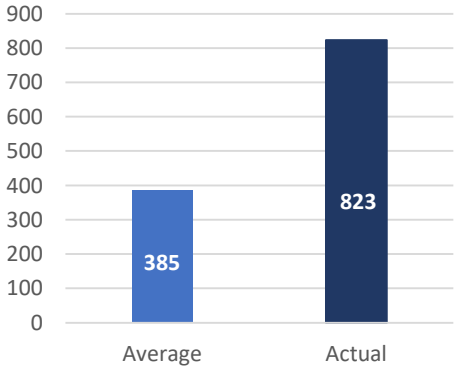
Results After 20 Months

Well1

- Installation: **AUG/2019**
- Chemical: **Scale Inhibitor**
- # Interventions: **8**
- Last reason: **Broken coupling**



Run Life

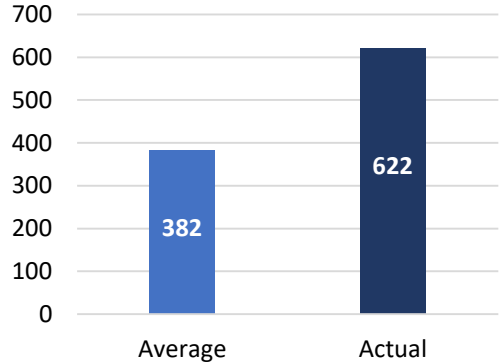


Well2

- Installation: **OCT/2020**
- Chemical: **Corrosion Inhibitor**
- # Interventions: **9**
- Last reason: **Pipe detachment**



Run Life



RESULTS



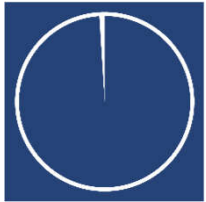
Results After 20 Months



Autonomously
adjusted injection
250–300 times
per day



ZERO failures
to date



99% actual vs.
target injection rate
compliance



> 75% reduction
in field trips



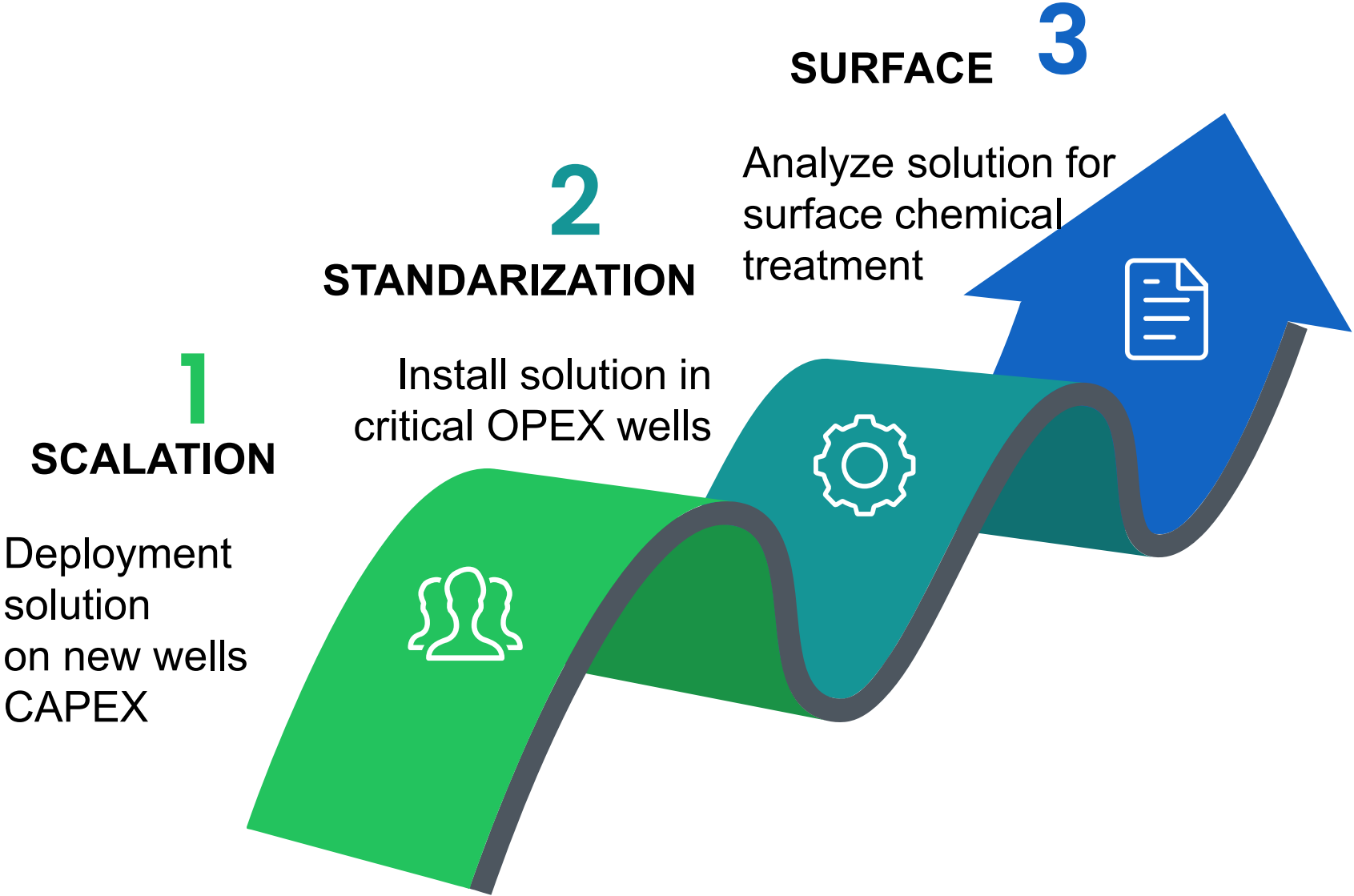
Virtual flow model
has been within
3% of all well tests



Estimated value:
> \$800K for
2 wells to date



Way Forward



Q/A

Thank you!