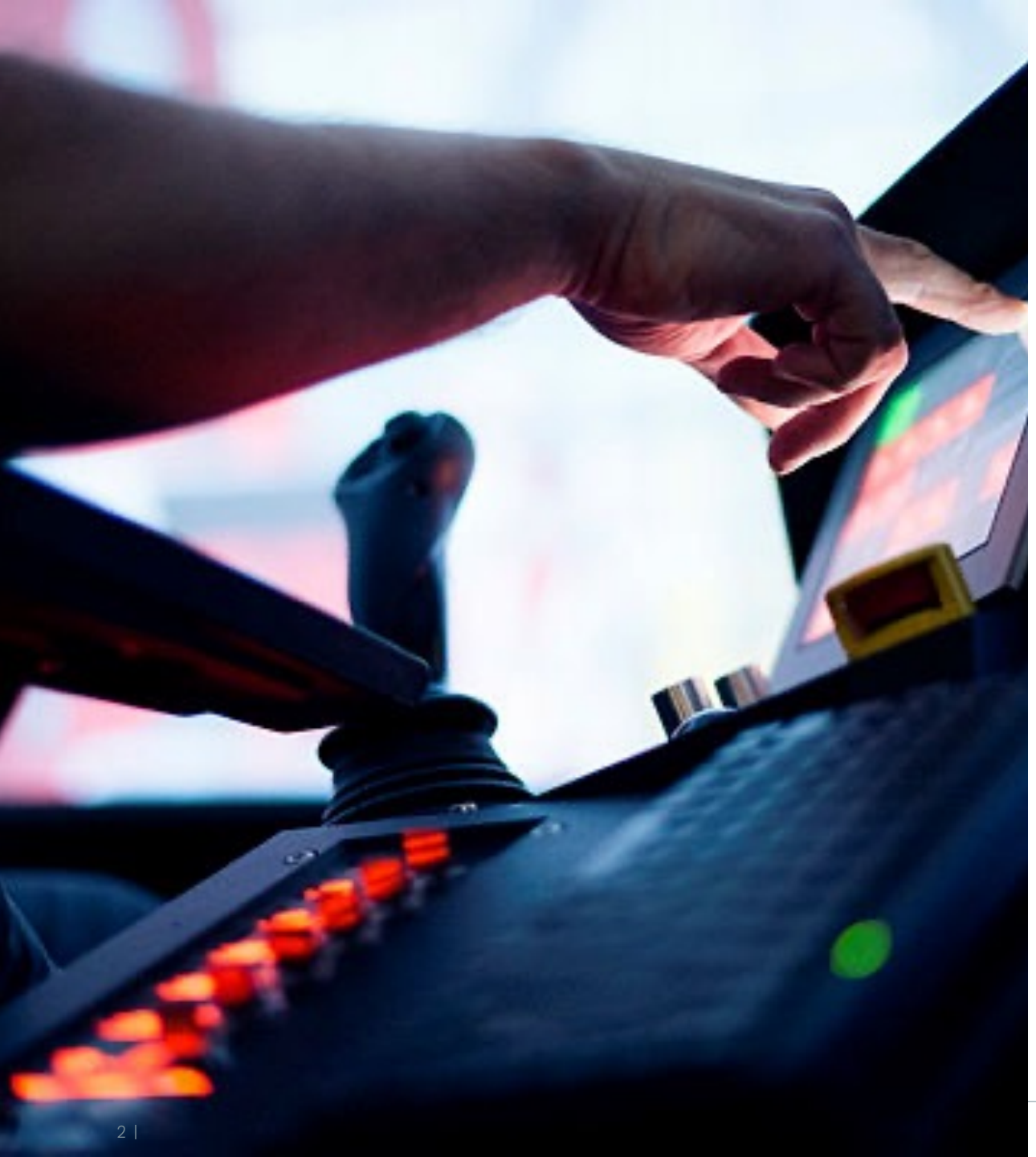
Borekonferansen 2023

Automation and digitalization on Johan Sverdrup; Equinor's Technology Flagship



Agenda

- Why automation and digitalization?
- Innovative technologies on JSDP
- Odfjell Technology – Travelling towards automation excellence
- Baker Hughes – Autonomous reservoir well placement
- What does the future look like?

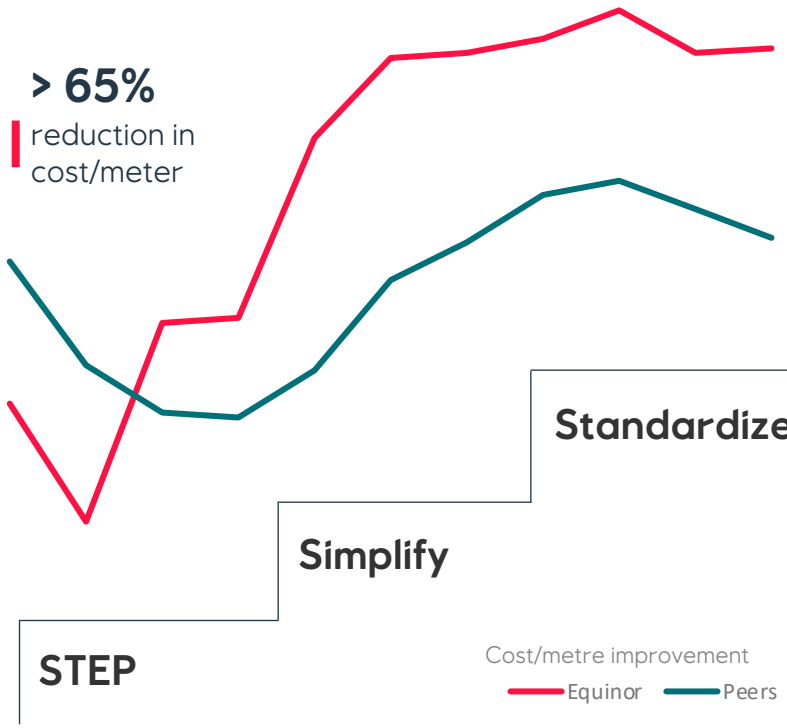
Perform/Transform
Drilling & Well

Last decade | Building a competitive advantage

~ 55%
reduction in cost/well

> 90%
increase in meters/day

> 65%
reduction in cost/meter



Transformation
Autonomous operations
People removed from line of fire
Enabling the energy transition

Industrialization
Automated planning-execute workflow
Data-driven decision-making
Low-emission rig

Automation
Automated drilling control
Digital well planning
Remote operations

World's first
zero emission*
offshore installation

World's first
commercial CCS
well delivered in 2022

Industry frontier on
ADC and high-speed downhole data

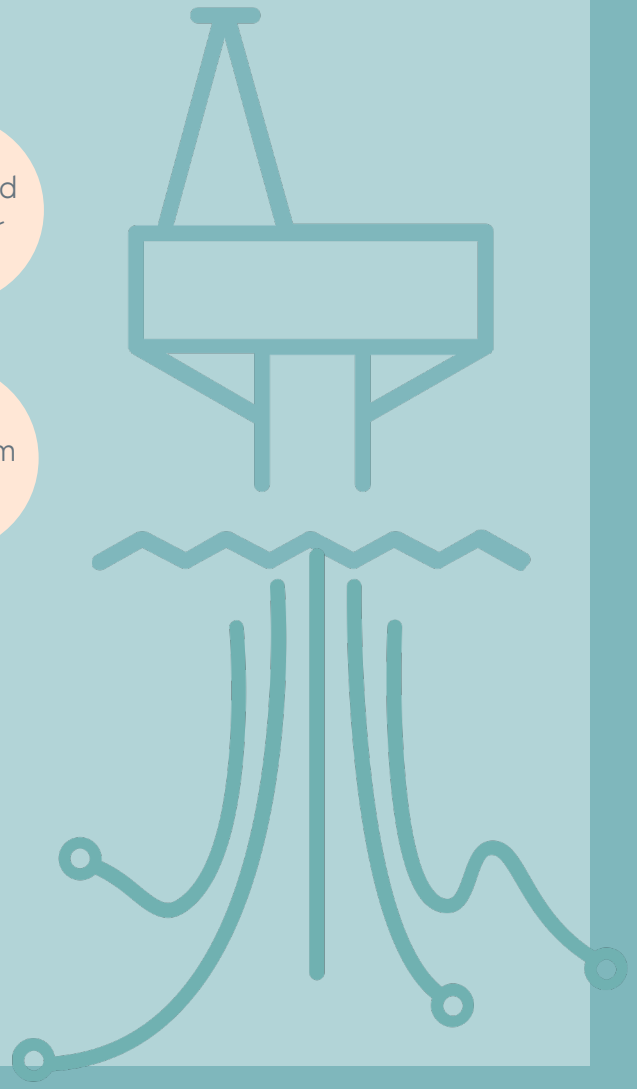
Next decade | Performing while transforming

* Norway's electrical energy mix is not 100% renewable (< 0.7 kg/barrel)

Shaping the future of the Drilling & Well industry

Safe and perfect well deliveries by unlocking the full potential of people and assets

- Autonomous operations
  - Digital well planning
  - Planning and operations center
  - Drilling automation
- Culture and transformational leadership
  - Safer and greener
  - One team
  - Drive change
- New ways of working
  - Work with anything from anywhere
  - Longer with fewer
  - Scale fast



Open

Collaborative

Courageous

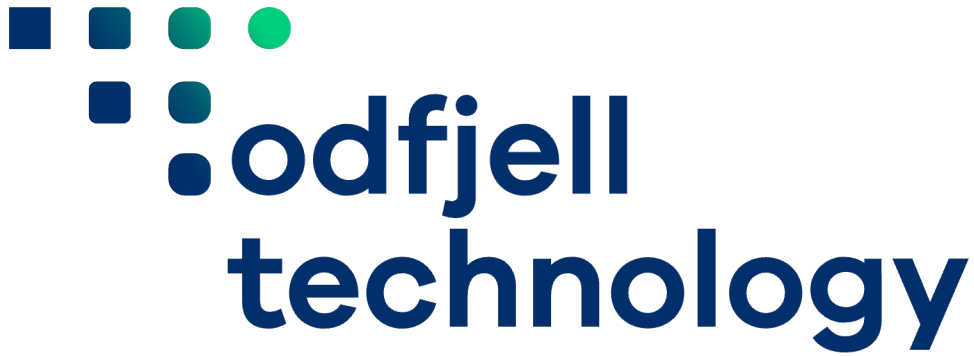
Caring

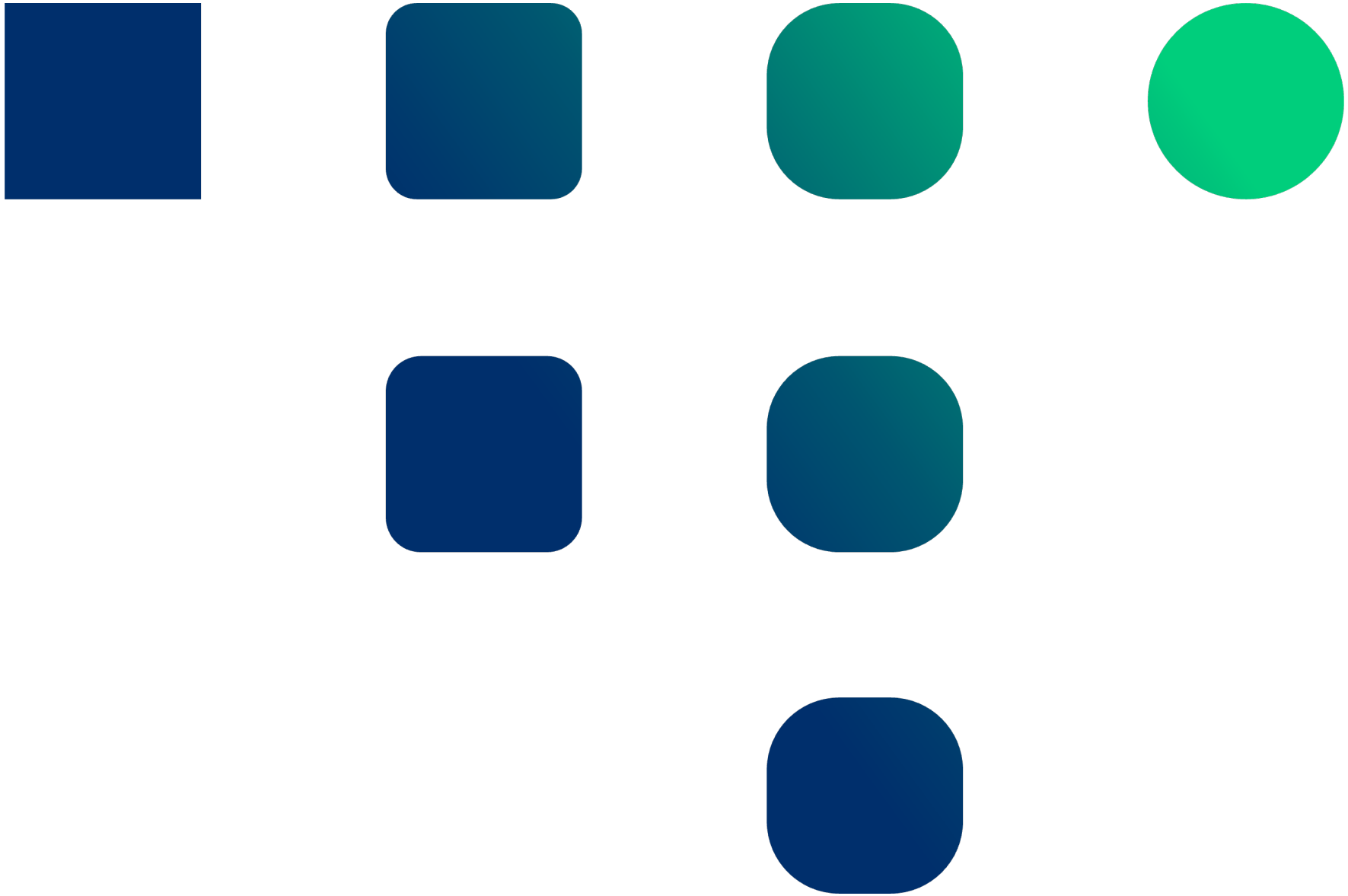
Always safe

High value

Low carbon

Innovative technologies on Johan Sverdrup


odfjell
technology



Johan Sverdrup DP

Automation Activated

Traveling towards **automation** excellence

Where were we?

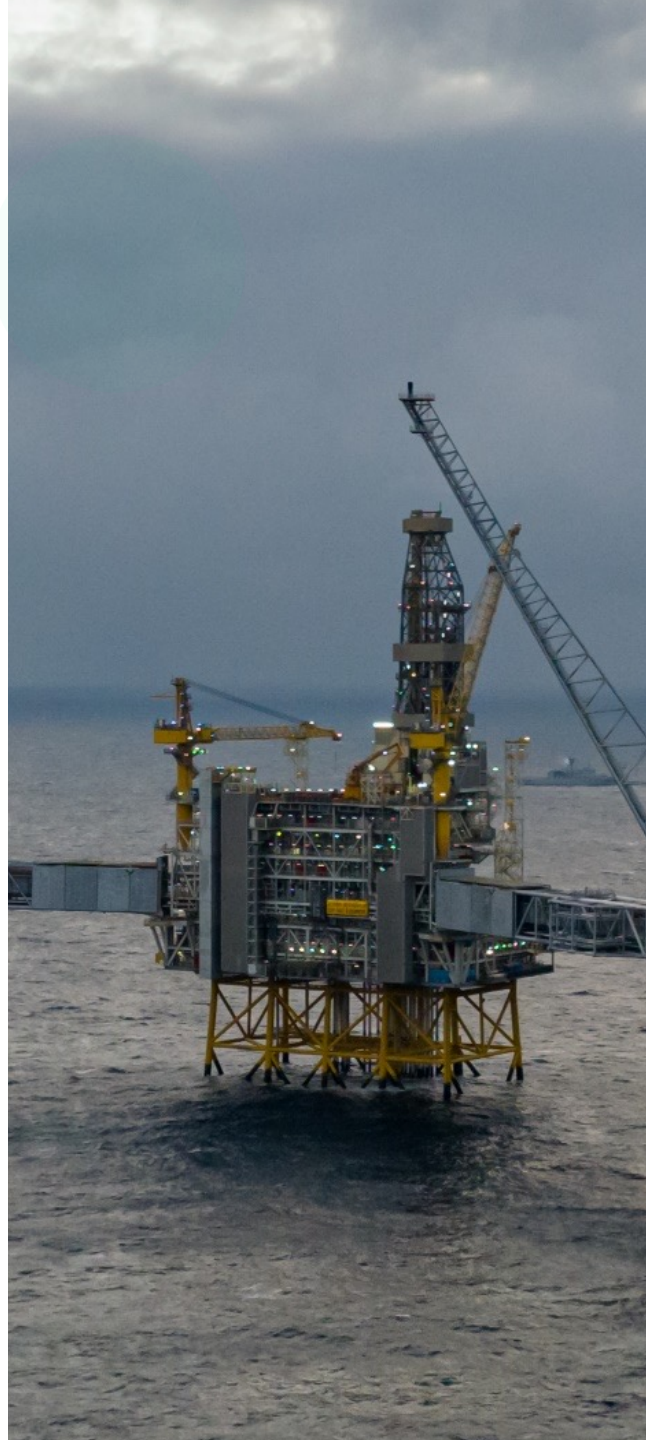
November 1st, 2021

- Older versions of automation software installed
- Almost non-existing utilization of automated systems.
- Mid-performing with large spread of results.
- Cell based operation with low information sharing
- Low interaction with equipment suppliers

Where are we?

November 1st, 2023

- Rig installed with latest and most updated versions of ADC technology
- High utilization of ADC technology
- High performing and consistent operations
- Close collaboration between all parties involved in ADC
- Numerous digital initiatives initiated



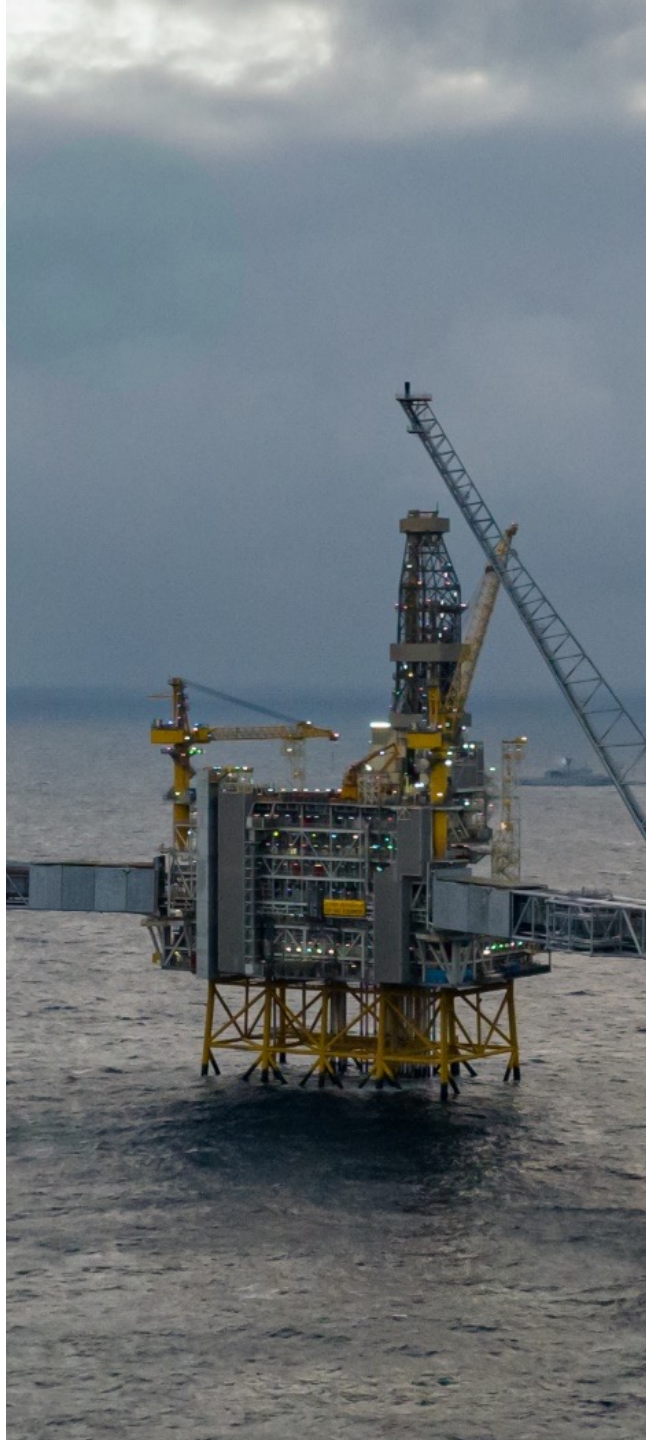
The **digital** flagship

Digital and automated equipment in use:

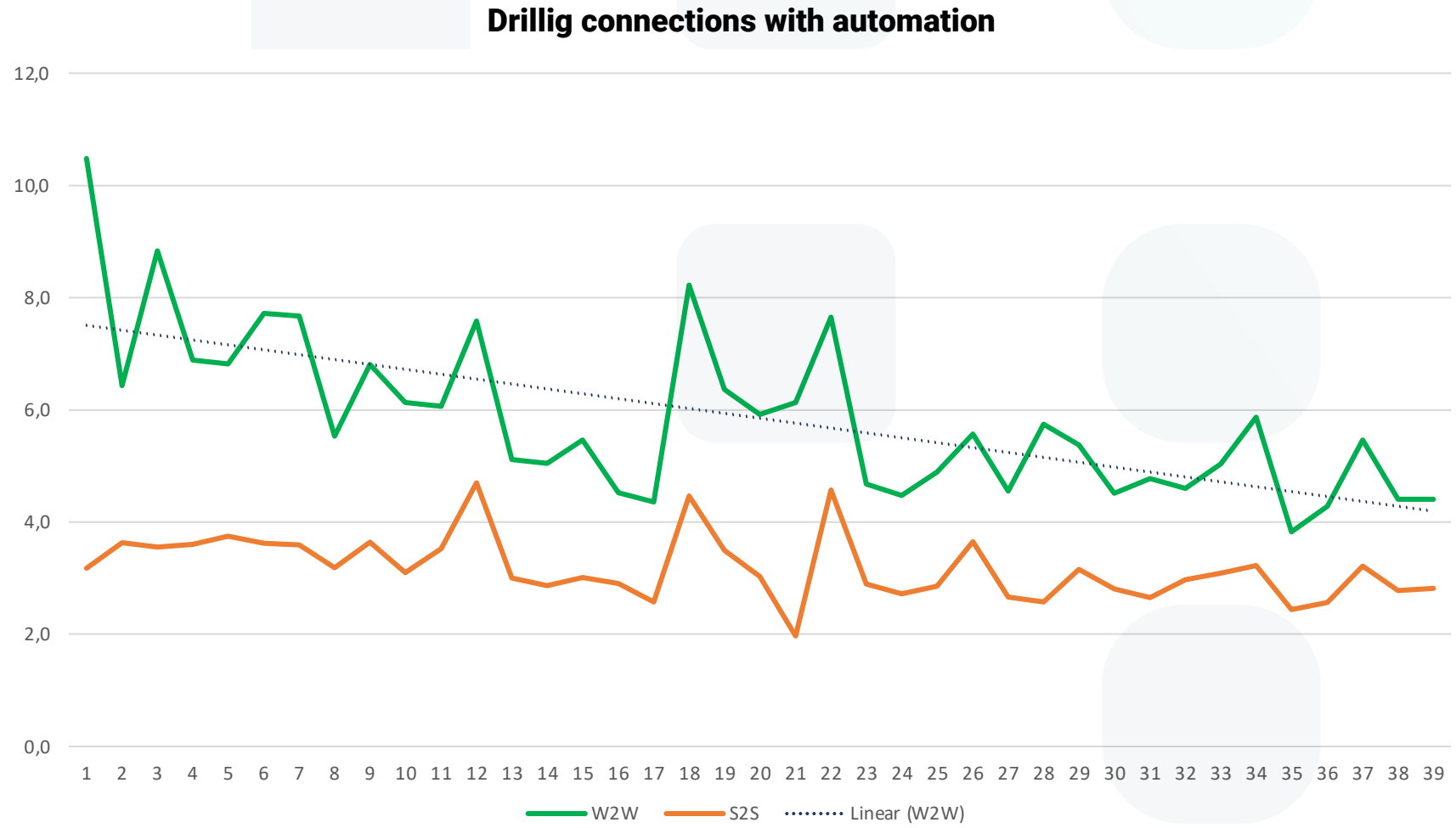
- NOVOS drilling control system
- MMC: automatic pipehandling system
- i-Trak: Automated directional drilling & geosteering
- DORS: Automatic Mud routing system
- Drilltronics: Automatic well safeguarding
- Digital DOP: Drilling operations plan in digital format
- Digital field workers: All employees equipped with mobile devices
- Rig Cadence: In depth performance analysis
- MCDT: Machine control diagnostics tool

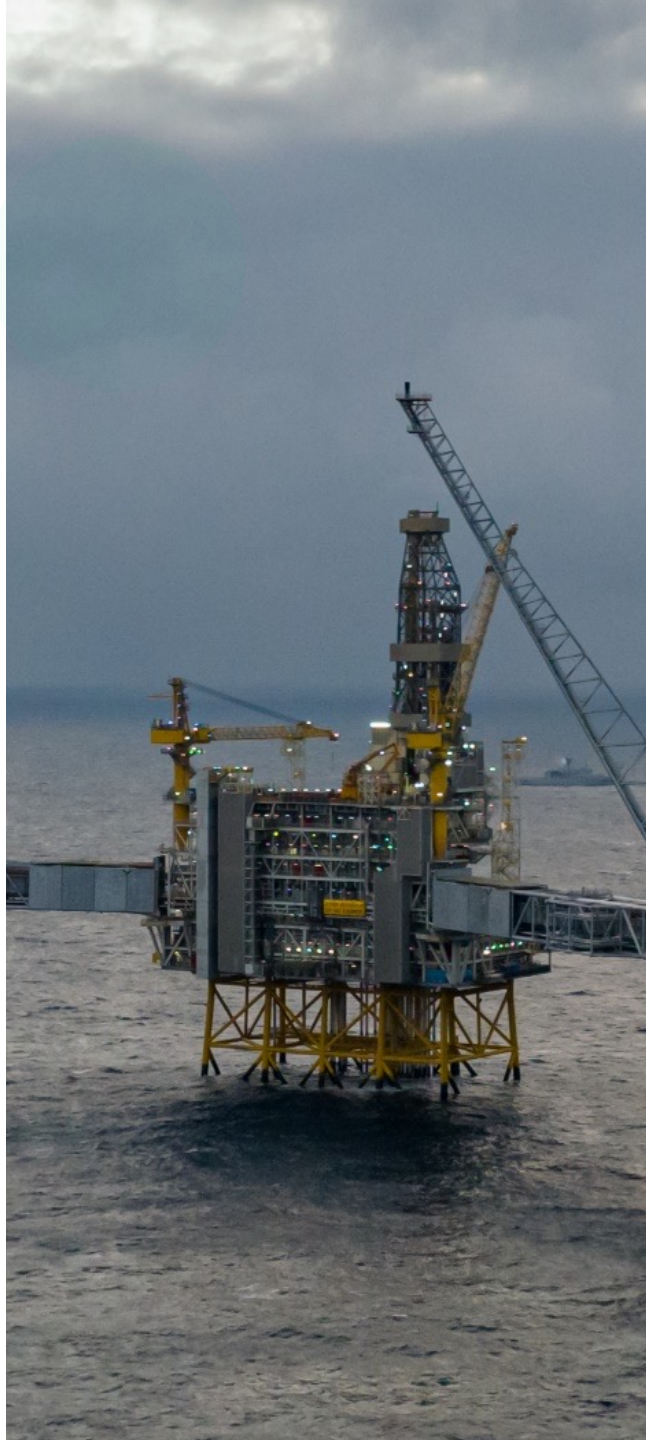
Future and ongoing digitalization:

- Visualization platform
- Enhanced sensor capabilities
- Digital Rig Management System
- Digital tally



Key Performance Indicators in ADC

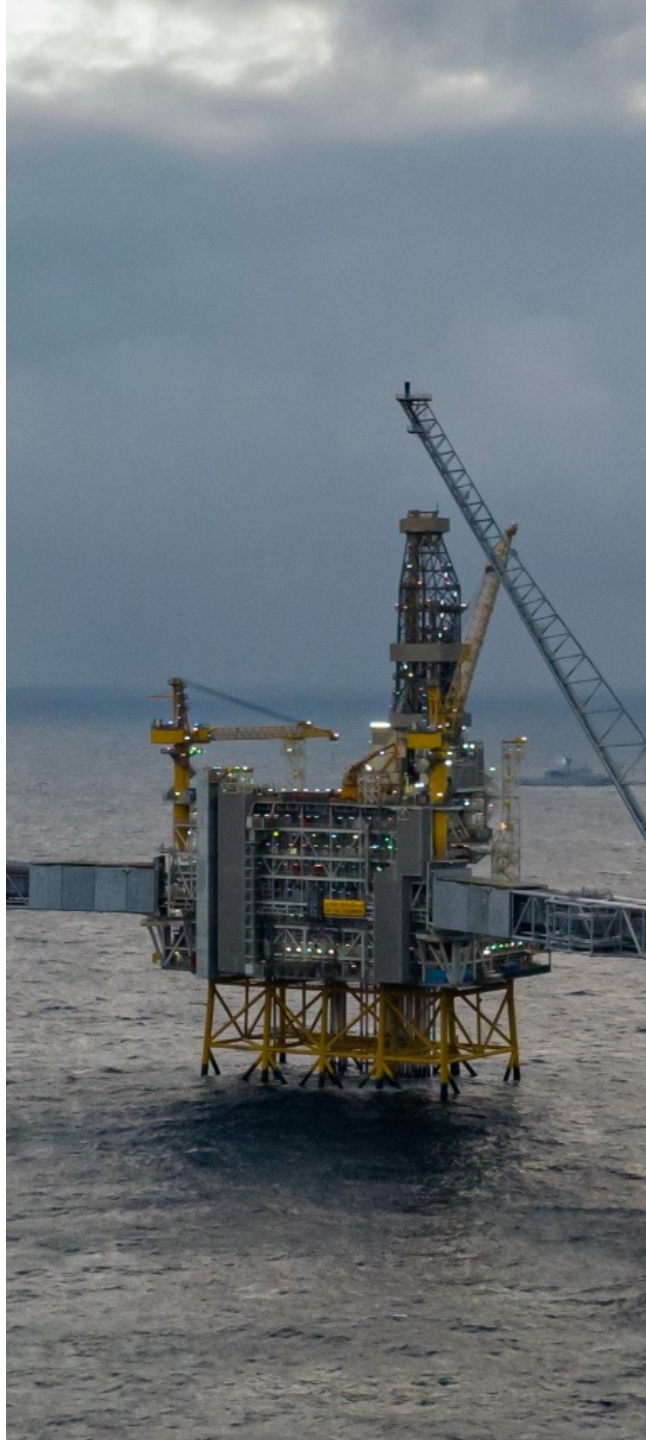




Success factors

- Keeping the users in center
- Close collaboration between all parties – ONE TEAM
- High amount of information sharing
- Creating new communication lines
- Project Fasttracking
- High user involvement
- 24 h support services

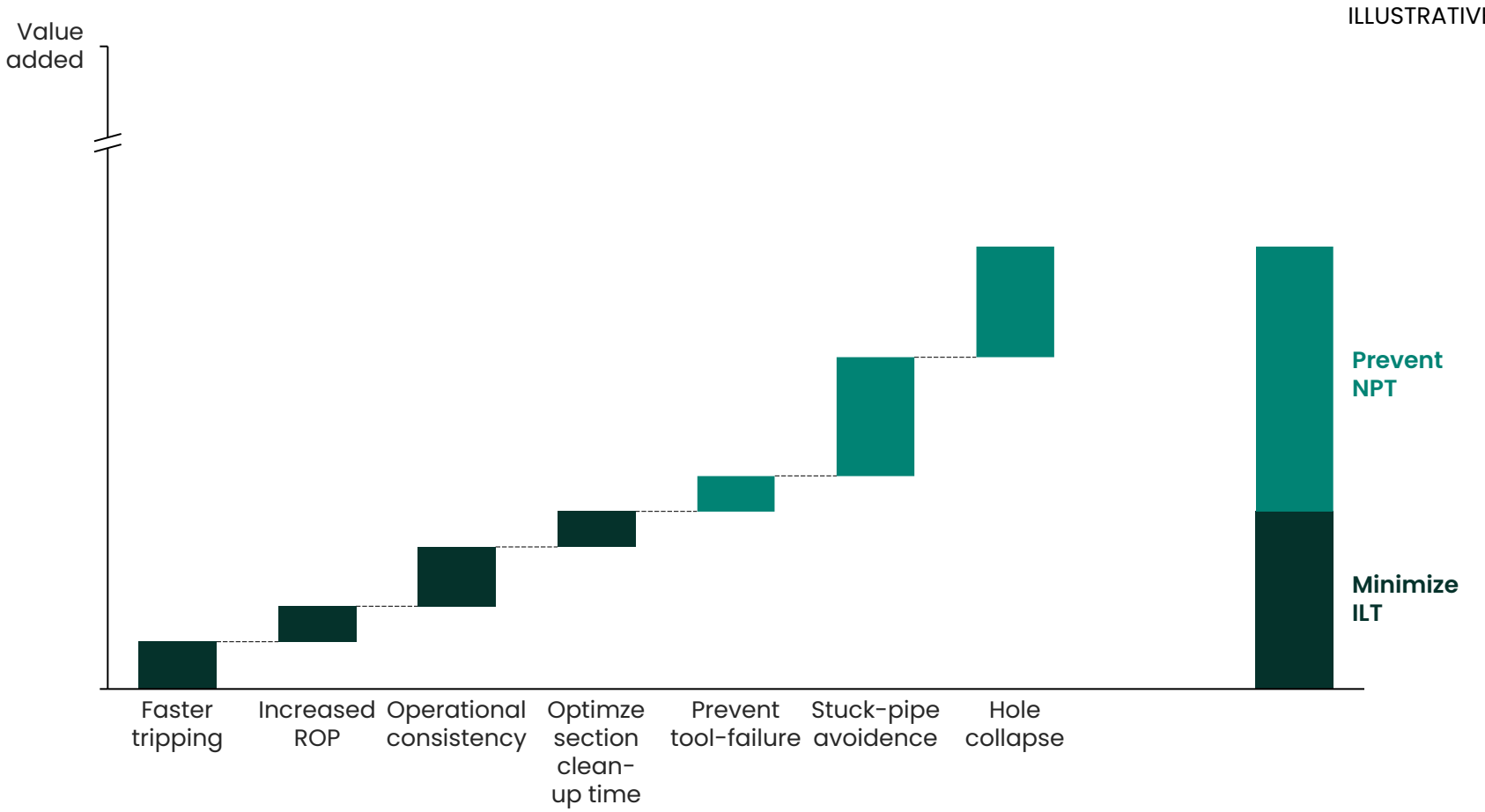
Highly engaged and dedicated crews has been the real catalyst for driving technology forward




odfjell technology
equinor
Baker Hughes

ADC & i-Trak proven to reduce well construction CAPEX through ILT & NPT minimization…

Breakdown of value added by automated drilling control (ADC)



Key insights

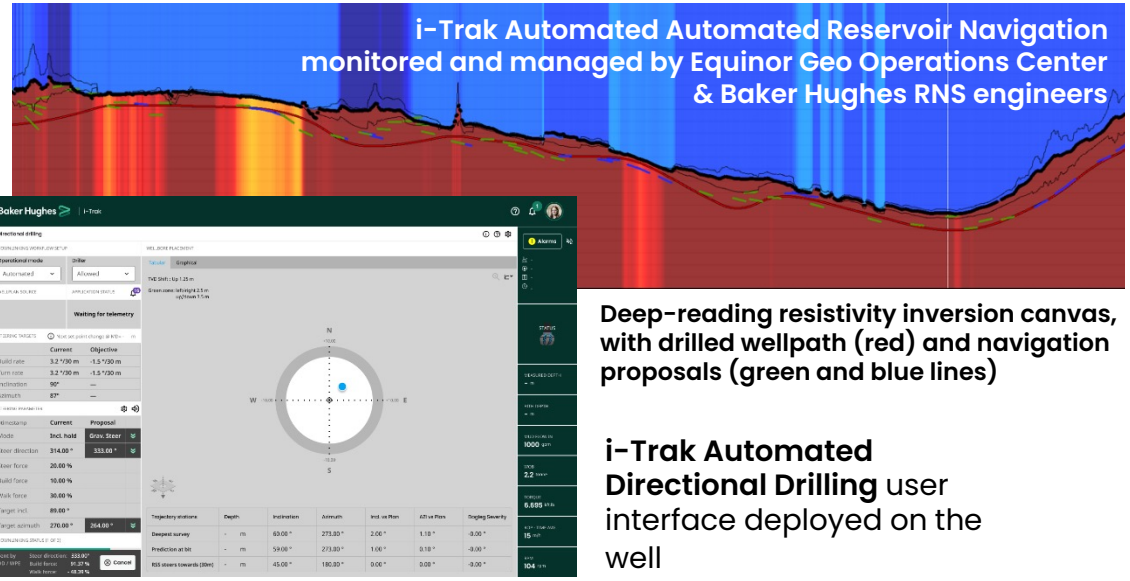
- Hydraulics applications proactively and reactively manage stuck-pipe and other wellbore related **major NPT**. ROP optimization advises and controls surface parameters to prolong tool and bit life and prevent un-necessary trips.
- ROP optimization and tripping advisor, as well as hydraulics applications for hole cleaning all drive down **Invisible Lost time** for the customer

Baker Hughes

~70% of an 8 ½" reservoir executed autonomously on Johan Sverdrup DP…

Combined **autonomous** well placement system

Automated Reservoir Navigation	**64%** navigation proposals generated automatically	36%
Automated Directional Drilling	**70%** footage (941m) drilled with automatic generation & execution of downlinks	30%



Deep-reading resistivity inversion canvas, with drilled wellpath (red) and navigation proposals (green and blue lines)

i-Trak Automated Directional Drilling user interface deployed on the well

Johan Sverdrup license operator Equinor ASA and partners Petoro AS, Aker BP ASA, and TotalEnergies EP Norge AS

What does the future look like?

- Automated and autonomous sequences of operations
- Seemless integration and interoperability between systems
- Continued reduction of the need for personell in line of fire.
- Input to ADC systems through digital prosedures