May 29th, 2025

Digital Twin for Normally Unattended Installation

And how to get the work done!

Technip Energies at a glance

Listed on
Euronext Paris
Stock Exchange

Headquartered in
Paris

65+
Years of operations

€6.9bn
Full year 2024 adjusted revenue

A global technology & engineering powerhouse leading in energy & decarbonization infrastructure

~€20bn
Backlog at end 2024

17,000+
Employees in 34 countries

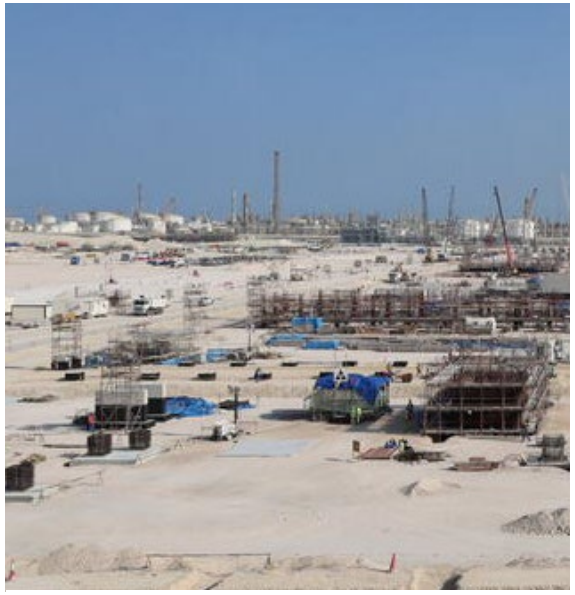
60+
Leading proprietary technologies

500+
Projects under execution

Technip Energies' leadership in key markets

LNG

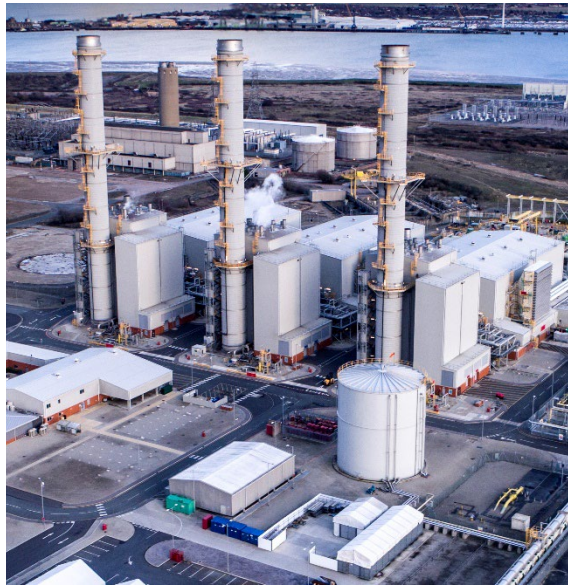
Global leader in LNG plant design and delivery



>20% of operating LNG capacity

Carbon Capture

Driving the CCUS market and carbon transformation



90+ CCUS studies

Sustainable Fuels

Driving the biofuels market with expertise and technology

2 proprietary technologies

Ethylene

World leader in design and construction of ethylene facilities

>40% of the licensing market share

TECHNIP ENERGIES

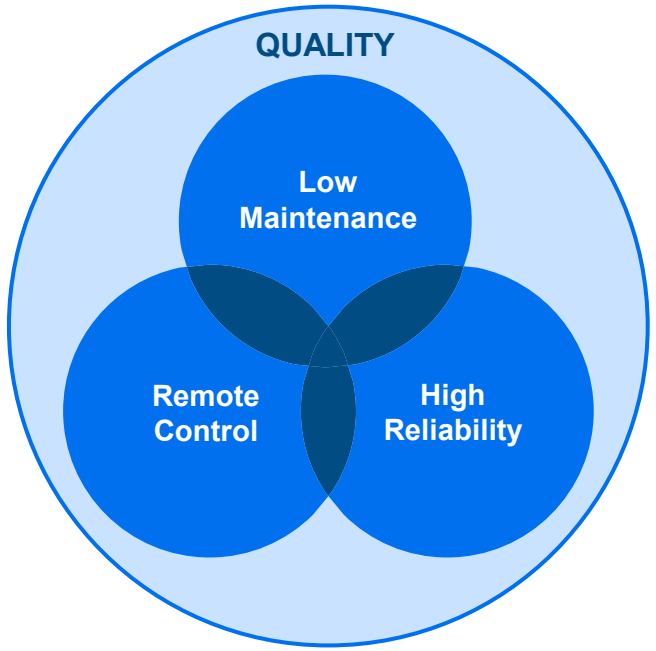
01 NUI Overview, Philosophy Requirements

Normally Unattended Installation

Quality pillars

- Decreasing on site attendance from 24/7 to a few weeks/year

Simplification



Data infrastructure

No defect

“Normally Unattended Installation” is a purpose-built facility which can be left unattended and still maintain its intended principal function through remote control from a distant location. (NORSOK STD S-001).”

T.EN Lean Design philosophy for NUI performance

NUI Design Trigger List

Remote Operations

- Remotely controlled operations & Automated systems
- Autonomous systems
- Constant monitoring and prediction (Digital-Twin)
- Minimized offshore commissioning
- Robotize to optimize instrumentation and automation

High Reliability

- Fewer components
- What you don't have can't fail
- Inherently Safe Design
- Design & Constructability Robustness
- Monitor reliability performance
- Manage NUI critical items
- Electrify process
- Reliability Centered Maintenance

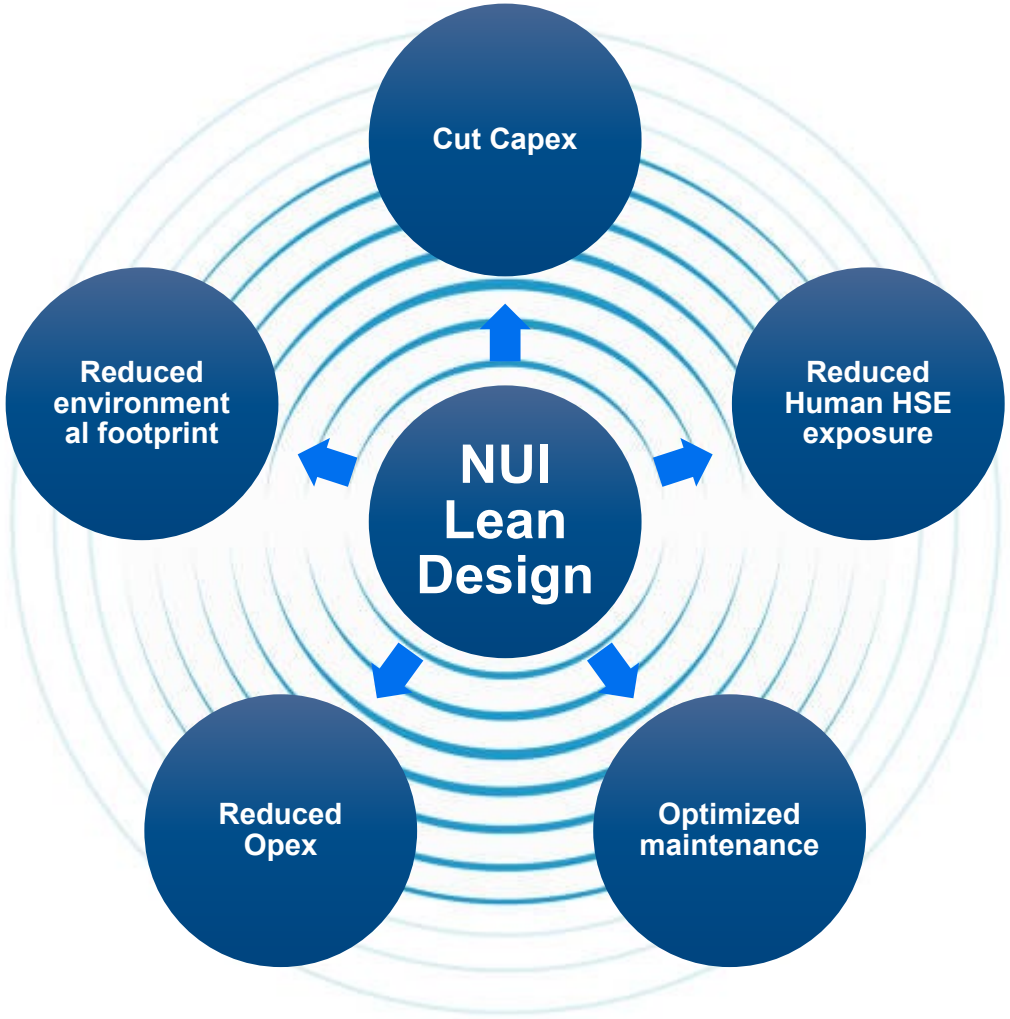
Low Maintenance

- Eliminate and simplify
- "Less is more"
- Low maintenance solutions
- Plug-and-Play philosophy
- Maintenance efficiency / lean design
- Upgrade equipment quality & material grade
- Condition based maintenance
- Monitor required maintenance intensity

Process simplification - Challenge functional requirements when simplification opportunities are identified

NUI Lean Design Philosophy – Ripple effects

NUI Lean Design Philosophy drives virtuous effect on solution's performance



Digital Twin & Advanced Monitoring during Operations

Operational & Maintenance Actions

Remote DCS
Industrial Cybersecurity / Security Operating Center

1. Digital Twin
2. Advanced Monitoring
3. Smart Maintenance
4. Simulators
5. Robotics

Data Acquisition

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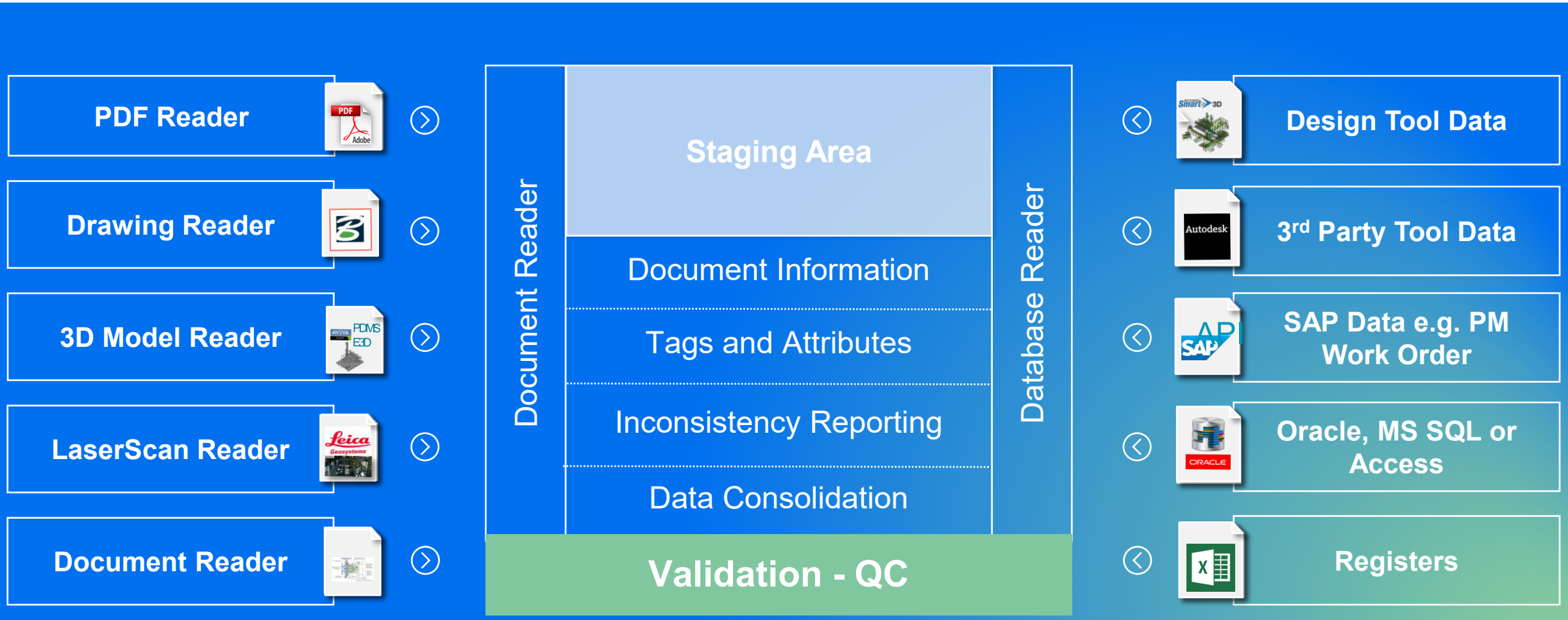
Historical, Simulated & Live data

Data security

02 Focus on selected NUI Technologies

Digital Twin

Data capture from information silos



DIGITAL TWIN

ASSETS

TUTORIAL

SETTINGS

CREDENTIALS

QUIT

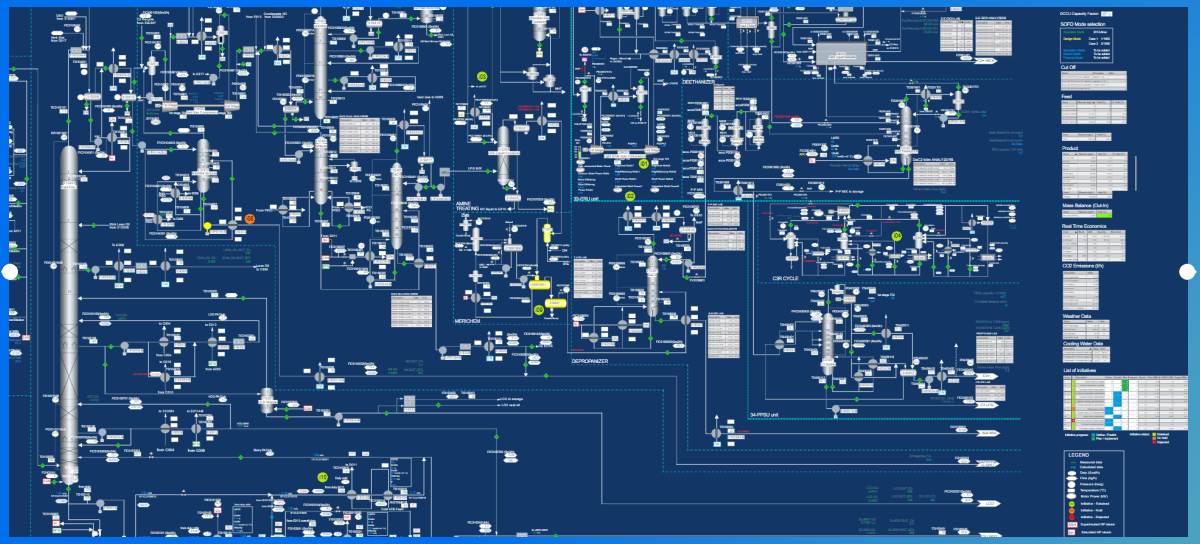
Digital Plant Performance Improvement

Digital back-office process expertise

Digital Toolbox — Smart Operating Flow Diagram — Robust Data Driven Model

Shared Services

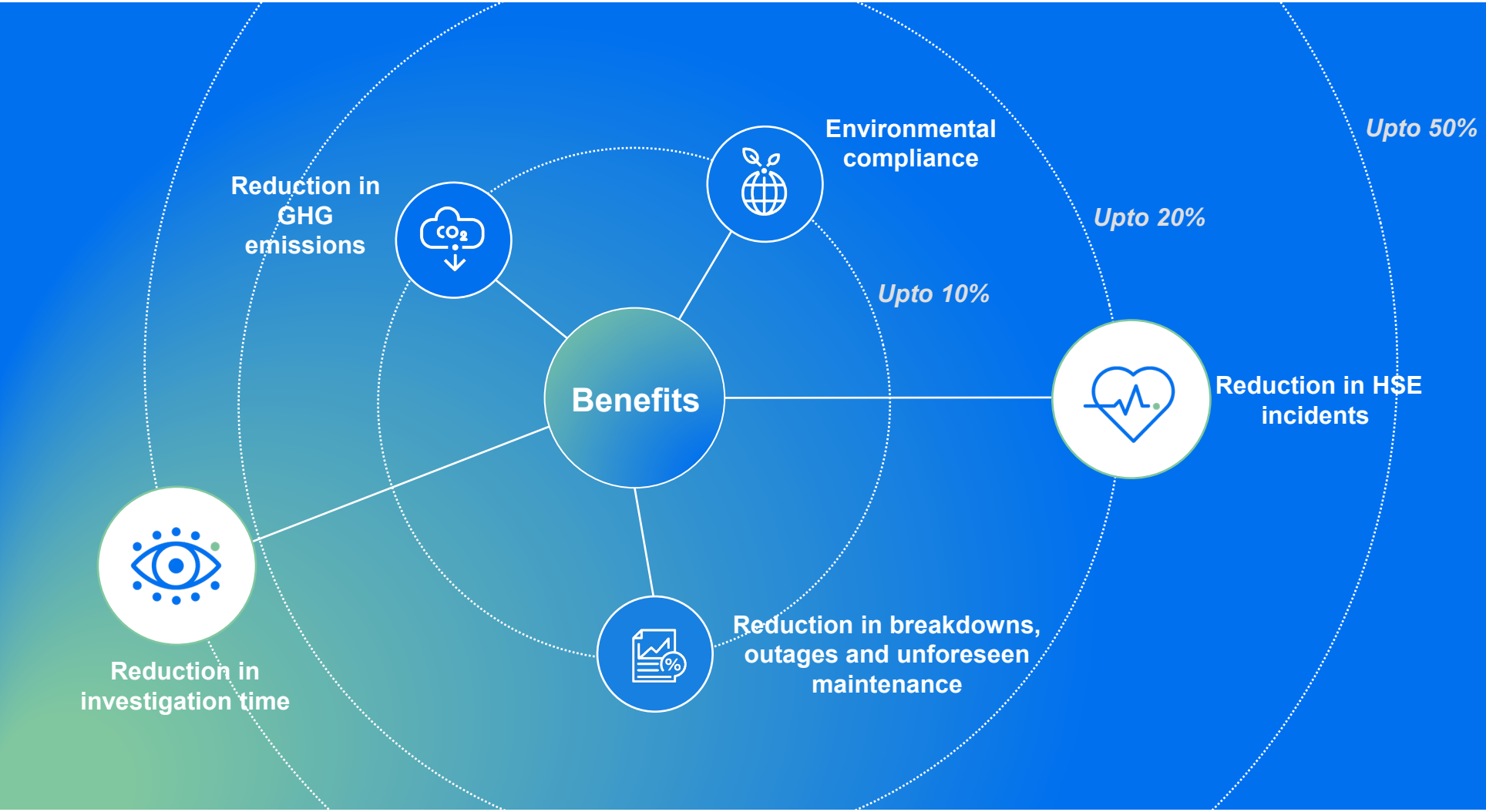
Technology center expert



Facility

Remote operationsteam

Situational Intelligence



What is IntelSite?

Improvement in key value drivers through visualization, monitoring and data analysis

Situational Intelligence

Effective disaster management is key to human safety

Key benefits

- Wearables, tracking devices and connected worker
- Accurate depiction in 3D model and 2D plan
- Muster point communication to all personnel
- Tracking and checking built into the situational awareness platform
- Possible integration with manpower registers and employee database for scalability
- Tracking of movable assets such as welding machines, cranes, robots, etc.

TECHNIP ENERGIES

Smart Maintenance – Based on RCM II philosophy

A data driven way of taking maintenance decisions and optimizing maintenance

1 Foundation

- Asset Codification
- Dynamic Asset Classification using multidimensional parameters
- CMMS Data Integrity
- Asset Register
- Coverage of Operations and Maintenance systems of record

2 Design

- Risk Assessment and Mitigation
- Failure Modes and Effects Analysis
- Systems Analysis
- Process FMEAs
- Define Asset Strategy based on criticality
- Define strategy for Regulatory and Compliance assets
- IT architecture, integrations, data flow, Interoperability

3 Implementation

- Develop maintenance and mitigation strategies based on risk assessment and inspection findings
- Establish PM schedules, Corrosion control measures, repair plans and replacement strategies.
- Spares Optimization – Categorization, Service levels and dynamic updates based on failure history

4 Sustenance

- Continuous Improvement with a feedback loop
- Documents and Data review mechanism and updation
- Specialized training on inspection techniques, risk assessment methodology, regulatory compliance, and RCM II philosophy.

Technip Energies solution description

PODS : Plant Operator Training Simulator

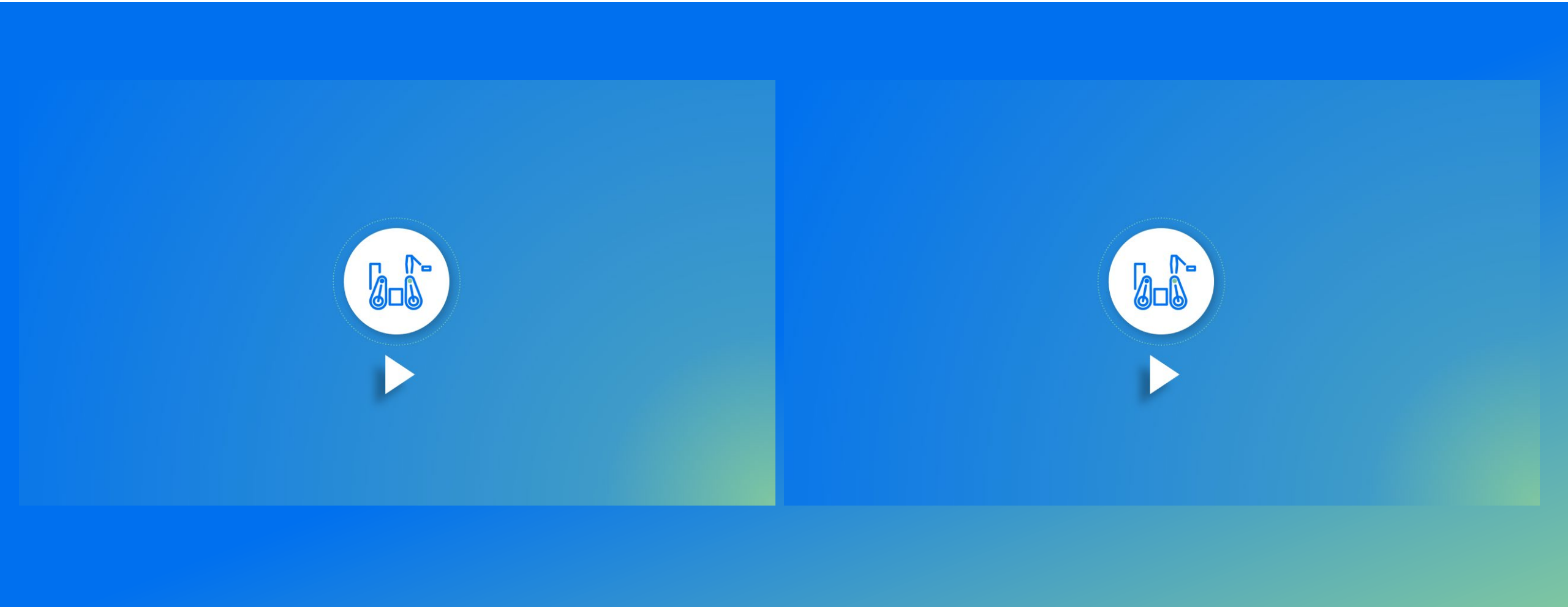
Tailor-made training sessions with complex scenarios

Improve and validate the operation procedure before the execution

Reduced Opex by minimizing time on site

Robotics Simulation

An important tool to select the right robot and de-risk real deployments



Identifying Use Cases

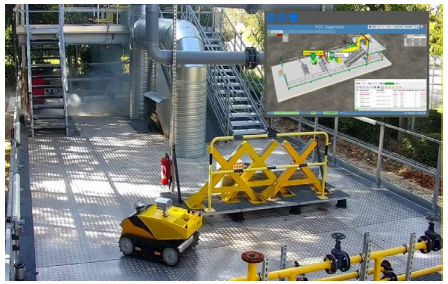
Work hand to hand with operations to prioritize use cases

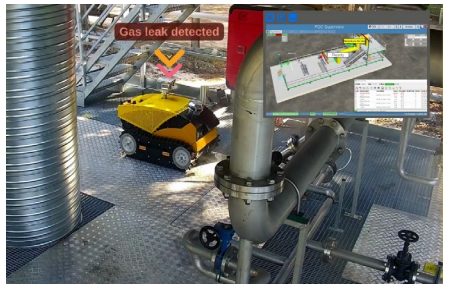
TECHNIP ENERGIES

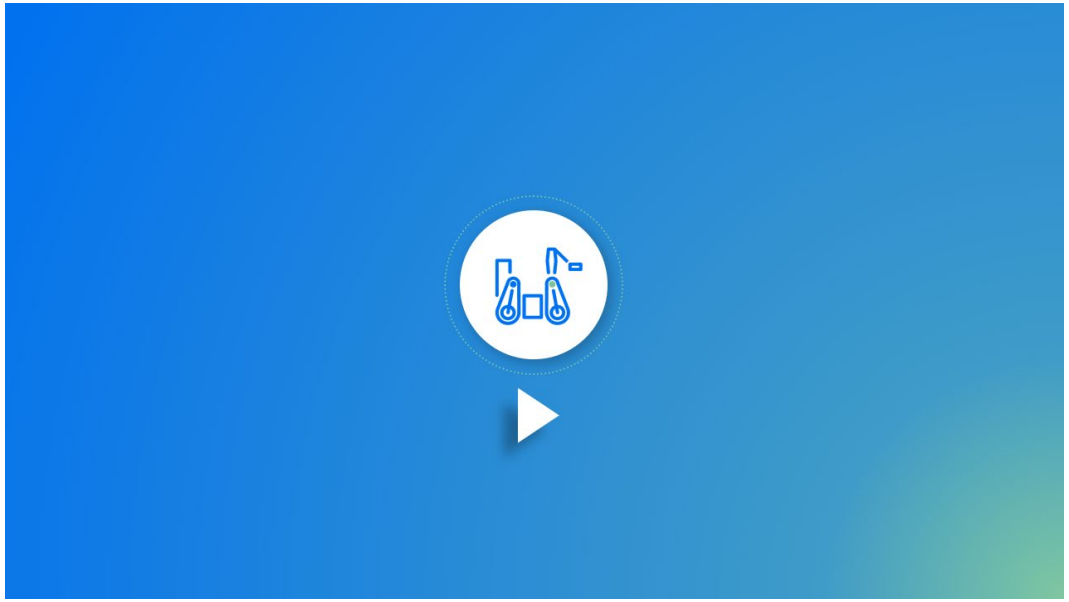
Inspection Robots

Industrial applications

- Operational and Visual checks
- Condition Monitoring checks
- Leak and Gas Detection
- Data Analysis
- Non mandatory inspections
- Operator Rounds



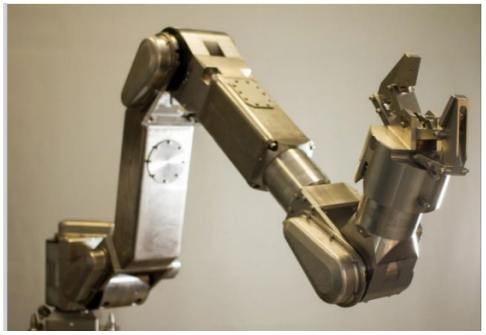


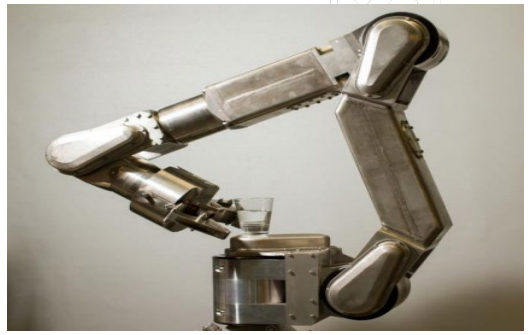


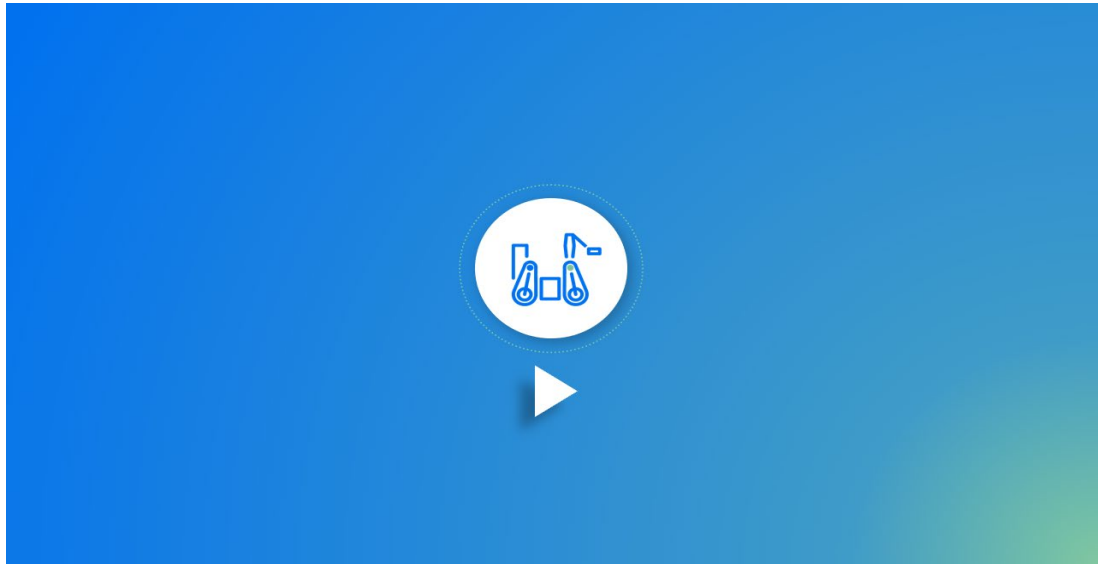
TECHNIP ENERGIES

Operations Robots

A versatile intervention robot

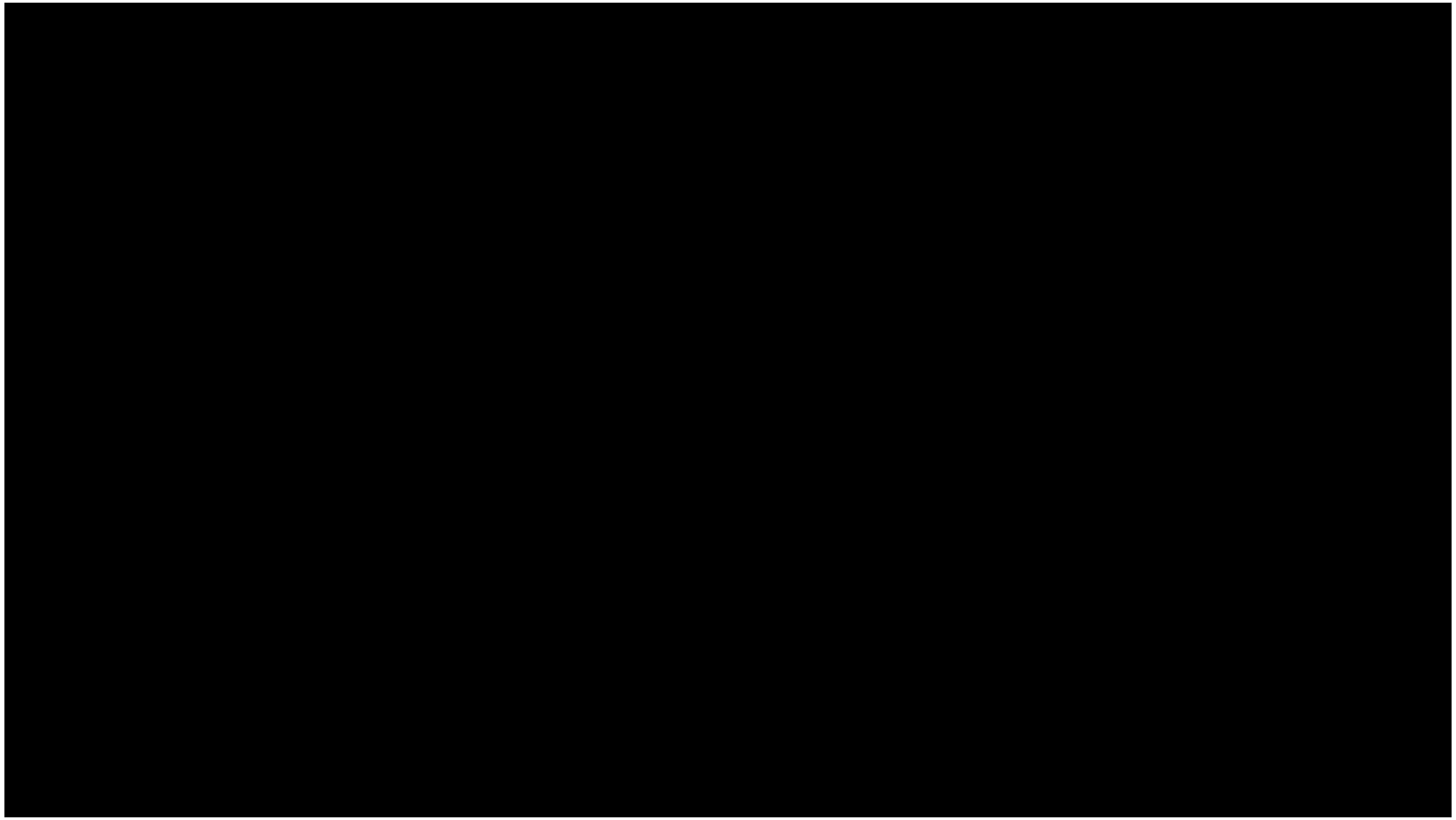






Centralized Operation Center

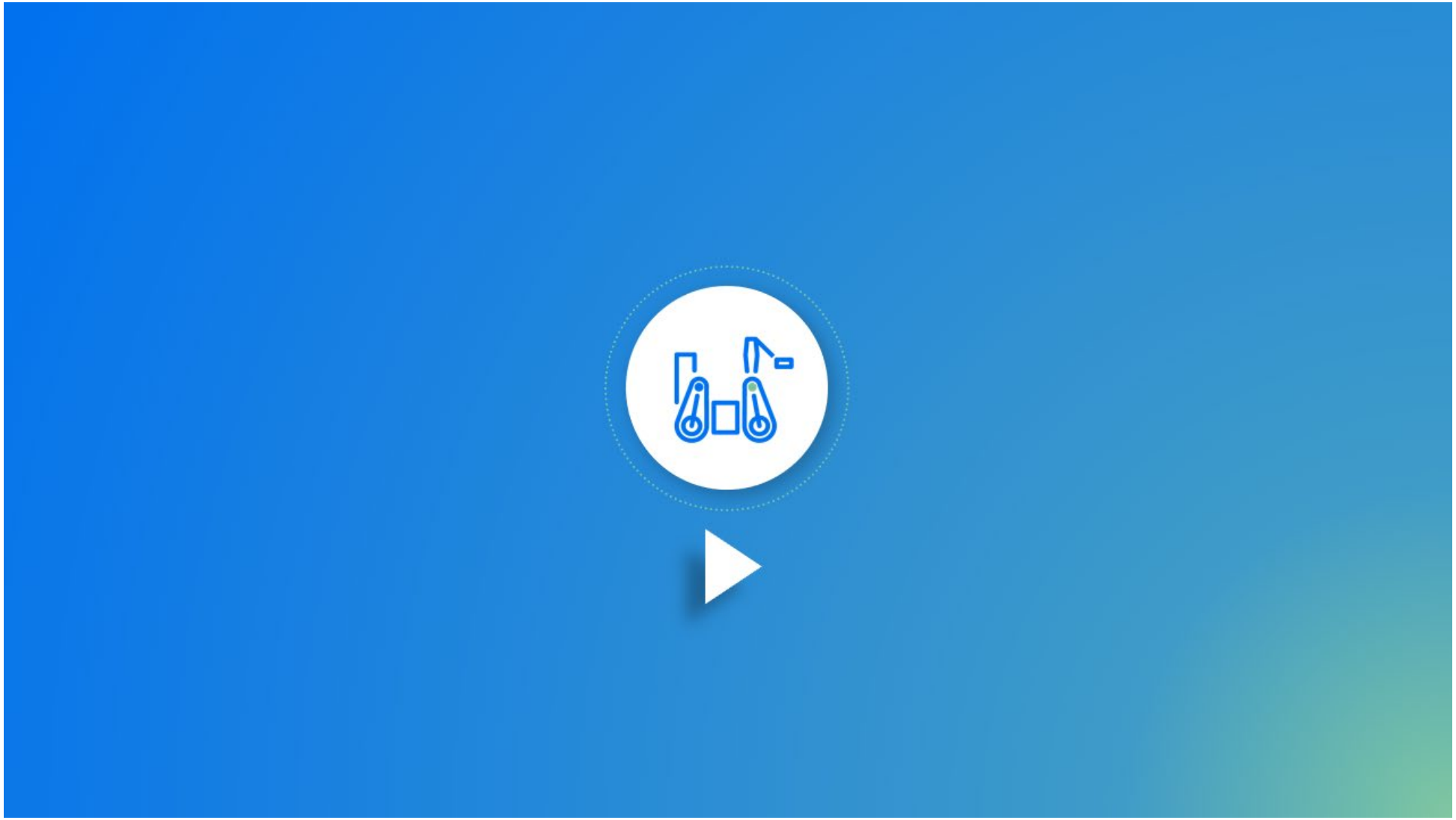
Monitoring operations from a fit-for-purpose control room



Key steps

- Develop data strategy
- Prepare data structuration
- Realize data integration
- Build the asset digital twins
- Integrate in digital center

Future Ready Automated Facility



TECHNIP ENERGIES

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Thank you