COGNITE

Data-Driven Predictive Maintenance:

Extend the lifetime of your assets with Industrial DataOps

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About Cognite

Cognite is a global industrial SaaS company that supports the full-scale digital transformation of asset-heavy industries around the world. Our core Industrial DataOps platform, **Cognite Data Fusion®**, enables data and domain users to collaborate to quickly and safely develop, operationalize, and scale industrial AI solutions and applications.

Cognite Data Fusion® codifies industrial domain knowledge into software that fits into your existing ecosystem and enables scale from proofs of concepts to truly data-driven operations to deliver both profitability and sustainability.

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Introduction

Maintenance and integrity spending contribute to a significant share of operating expenses for companies in asset-heavy industries such as oil and gas, power and utilities, and manufacturing. For mature assets, this share can be as high as 70%.

Incorrectly maintained assets can hurt production and reduce the lifetime of assets. While the value opportunity within maintenance and integrity is widely recognized, it remains untapped.

Today, many companies run large maintenance operations with distributed ownership. Information such as equipment health history, sensor data, and documentation is locked away in different systems, meaning that alarms, calendars, and personal experience drive maintenance analyses and decisions — not data.

In addition to a lack of data, there's also a lack of communication. Collaboration is hindered by too many organizational silos, coordination between maintenance and production optimization decisions is lacking, and original equipment manufacturers (OEMs) are often disconnected from maintenance work.

Industrial data operations (DataOps) can help industrial companies improve both communication and data flows. This new discipline breaks down silos and enables data and domain users to collaborate to develop, operationalize, and scale industrial AI solutions and applications that optimize planning and execution of maintenance activities, predict failures, reduce deferments, shrink backlogs, and cut costs.

Extend the lifetime of your assets with Cognite Data Fusion®, the leading Industrial DataOps platform.

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Cognite Data Fusion®

The value of industrial data, liberated and contextualized by a new generation of software solutions, is widely recognized. The willingness to share, open, and digest data is catching on across asset-heavy industries. And adopting industrial software, digital tools, robotics, and new, agile ways of work is gaining ground.

The foundation for the necessary, sustainable reinvention of industry is here. Required now, and at scale, are the know-how, the technology, and the tools to transform.

The software to do this transformational work for asset-heavy industries is Cognite Data Fusion®.

Cognite Data Fusion® is an Industrial DataOps platform that facilitates data and AI workflows, giving organizations trusted data to build solutions and applications with speed at scale.

With Cognite Data Fusion®, organizations can achieve record time to value. ▶

With Cognite Data Fusion®, organizations can achieve record time to value

90%
Less time spent finding data

50%
Less time spent making sense of data

10–25x
Faster solution deployment

WATCH A WALKTHROUGH OF THE COGNITE DATA FUSION® ARCHITECTURE →

What is Industrial DataOps?

"DataOps is a collaborative data management practice focused on improving the communication, integration, and automation of data flows between data managers and data consumers across an organization."

Gartner

"DataOps is the ability to enable solutions, develop data products, and activate data for business value across all technology tiers from infrastructure to experience."

FORRESTER®

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Cognite Data Fusion®:

--> Makes industrial data available. The fastest path to tapping into the value potential of digitalization in industry starts with getting the right data with the right context to the right users at the right time for the right problem.

Cognite Data Fusion® eliminates the time spent on manual data contextualization, offline data discovery, data ingestion, developing a hosting environment, and preparing application data for application consumption.

--> Makes industrial data usable. Industrial data becomes truly useful when it is integrated, contextualized, and made securely available, explorable, and actionable to all data consumers—human and machine—within and outside the industrial enterprise. This should encompass all the various sources and formats, including sensor data, process diagrams, 3D models, event histories, asset models, and unstructured documents.

Cognite Data Fusion® enables data and domain users to collaborate to quickly and safely develop, operationalize, and scale industrial AI solutions and applications to production.

--> Makes industrial data valuable. Extracting maximum value from data relies on being able to apply advanced models to produce insights that inform optimal decision-making, empowering operators to take action with confidence. This, in a nutshell, is what is meant by operationalizing data into production for value.

Cognite Data Fusion® codifies industrial domain knowledge into Industrial DataOps software that helps industrial operations draw insights from their data, unlock opportunities in real time, and scale solutions effortlessly.

Cognite Data Fusion® at a glance

Asset-heavy industries need to optimize production, improve product quality, and reduce unplanned downtime by generating more value from their data. Cognite Data Fusion® tackles the most difficult industrial data challenges to provide open, contextualized data for organizations.

Industrial data challenges

Cognite Data Fusion® provides DataOps at scale for industry, making industrial data accessible, understandable, and useful for data scientists and developers. Cognite Data Fusion® unlocks use cases for industrial data by providing:

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Data in context

The machine learning contextualization services in Cognite Data Fusion® create relationships between siloed data such as time series, ERP and work orders, tabular data, IoT logs, events, 3D, and photogrammetry.

Open application architecture

Open standards enable easy integration with widely adopted applications and developer tools.

Developer-friendly SDKs and APIs further enhance connectivity.

Known data quality

Manage data quality on a use case basis to ensure recommended actions are valid and trustworthy.

Use prebuilt rules and create new rules with an available logic engine as needed.

Scalable data model

Use templates to scale successful proofs of concept across an entire class of equipment or assets.

Reuse the contextualized data model to solve many use cases from the same model.

Live data access

Combine live operational (OT) data with simulation or historical data to create hybrid AI models that can address use cases in production optimization or quality.

Complete data spectrum

Integrate and contextualize unstructured data to enhance asset and process visibility:

- Robotics to support monitoring and inspection
- Computer vision managing environmental conditions
- Digitize analog signals to support data models

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Cognite Data Fusion® benefits:

- Expand the breadth of applications and accelerate development time with a robust data model
- Empower internal development teams with self-service open APIs and SDKs
- Combine your organization's knowledge with Cognite's domain talent and proven partner network
- Democratize embedded subject-matter expertise with data access and contextualization

Cognite Data Fusion® enables hybrid AI

Hybrid AI combines physics-based models and simulations with artificial intelligence to create robust solutions with a high degree of confidence.

Physics-driven modeling and simulations

Hybrid AI

Unique to industrial reality

Data-driven machine learning

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Cognite Maintain

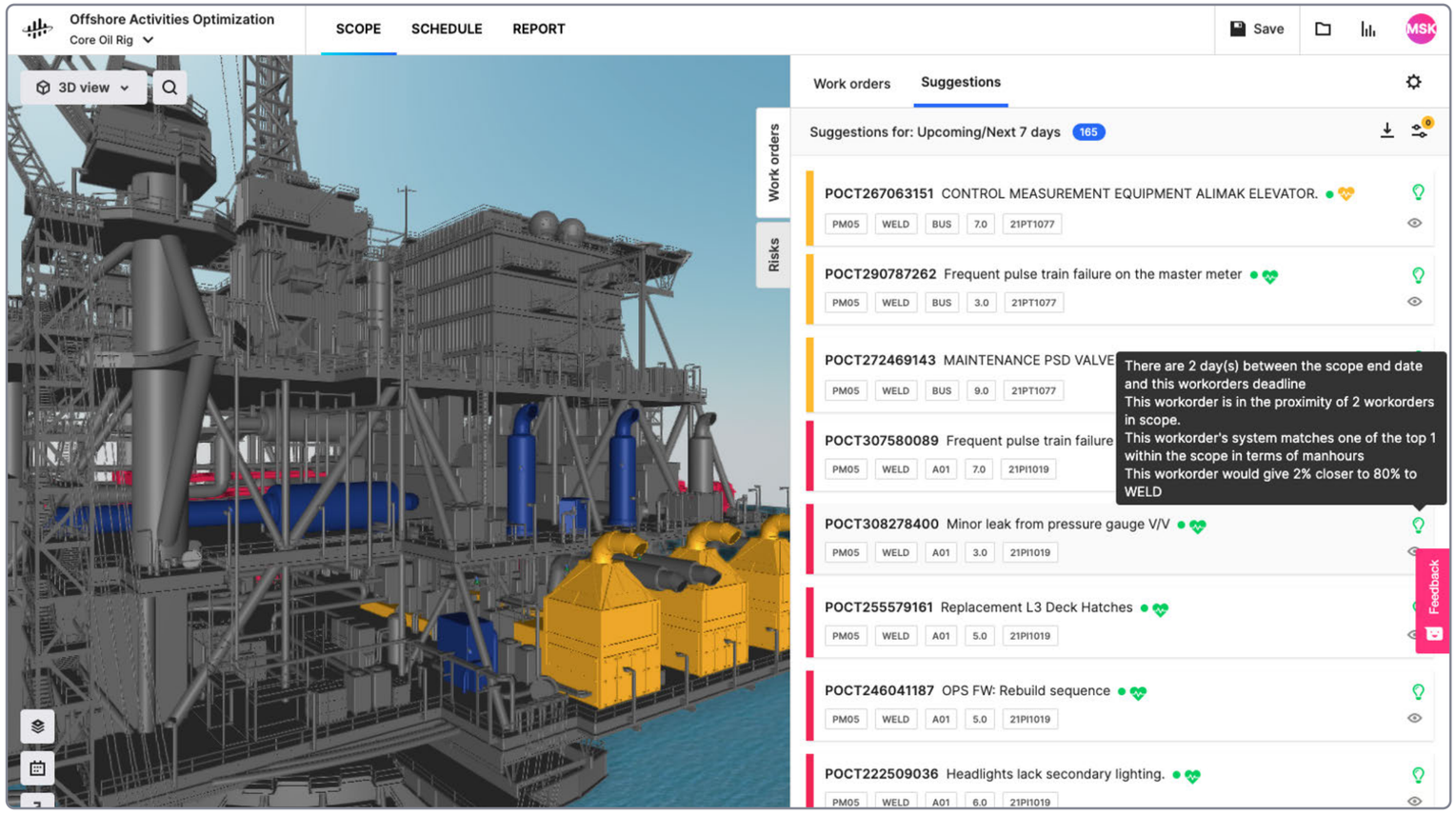
Cognite has developed a suite of software as a service (SaaS) applications that showcase the power of contextualized data in Cognite Data Fusion®. For data-driven maintenance, Cognite offers the apps **Maintain** and **InField**.

Cognite Maintain helps industrial companies optimize their planning and scheduling of field activities to identify opportunities, avoid clashes, and reduce shutdowns. The app breaks down traditional data and organizational barriers to bring AI and seamless collaboration into maintenance processes, enabling planners and coordinators to construct, optimize, and analyze plans flexibly, intuitively, and automatically.

With Maintain, maintenance planners no longer have to manually access individual data sources to create an optimal plan for execution in the field. The app contextualizes open work orders, ongoing barrier risks, health, safety, and environmental (HSE) risks, discipline availability, and more to visualize the data needed to optimize the maintenance schedule.

5–30%
Reduction in planned shutdowns per year

5%
Efficiency gains on overall maintenance execution



WATCH A DEMO OF COGNITE MAINTAIN IN ACTION →

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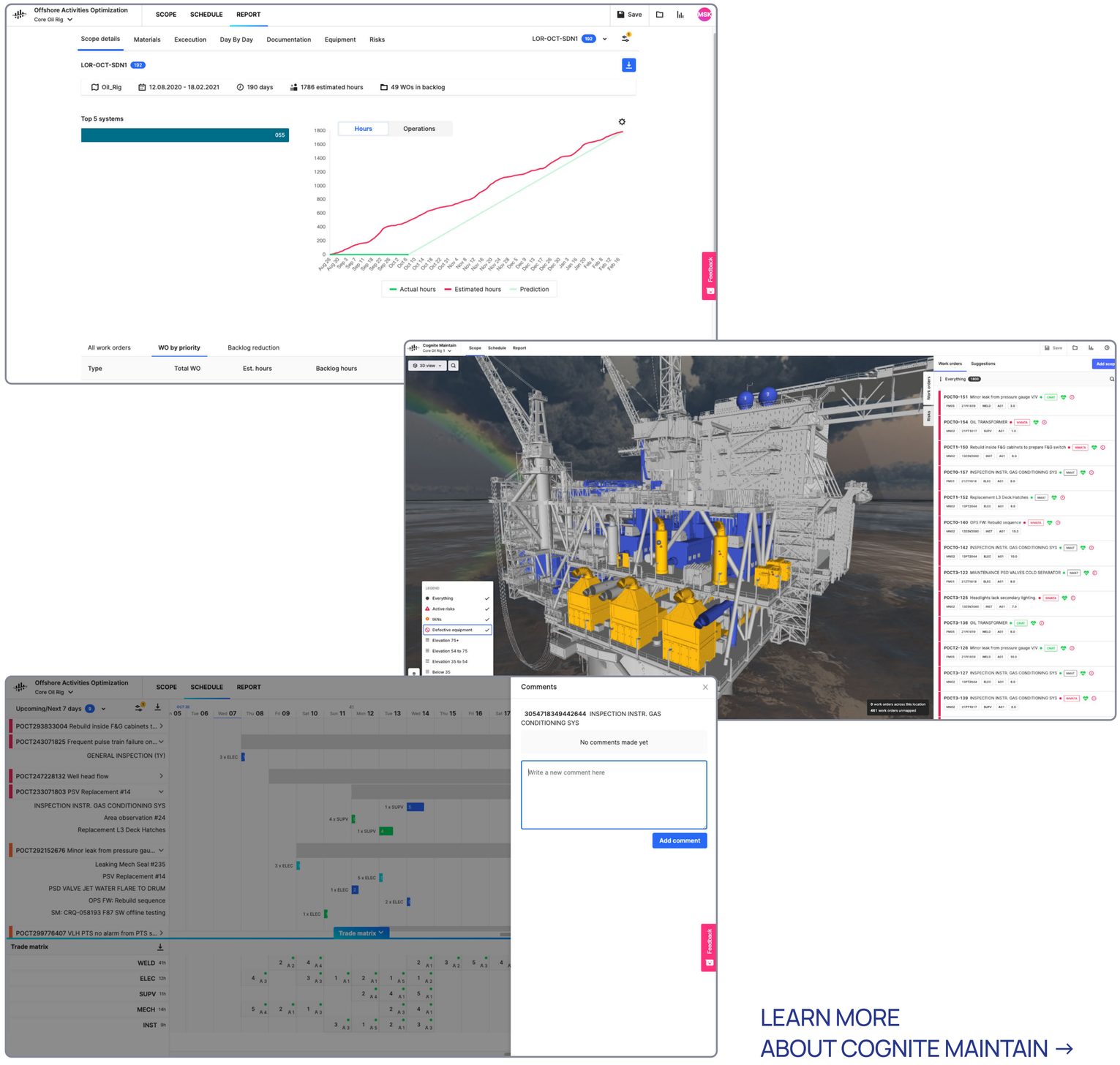
With Maintain, maintenance planners can:

--> Scope. Cognite Maintain maps work orders on interactive engineering diagrams and high-fidelity 3D models of industrial installations, helping users quickly identify and visualize essential data. Work orders are color-coded based on priority and can be filtered based on discipline, schedule, and more. A suggestion algorithm helps users find relevant work orders to add to a scope, improving efficiency.

--> Visualize schedules. Cognite Maintain visualizes the sequence of maintenance activities, which disciplines are involved, and whether or not resources are appropriately loaded. Users can easily adjust and fine-tune schedules to fit their exact needs, taking into account capacity and personnel on board (POB) limits, all in collaboration with their colleagues.

--> Report. Cognite Maintain supports automatic report creation in Microsoft Excel and PowerPoint. Users can see the scope status in an S-curve, the overall material status, a day-by-day view, and more, providing useful insight to colleagues and other stakeholders.



LEARN MORE
ABOUT COGNITE MAINTAIN →

Cognite InField

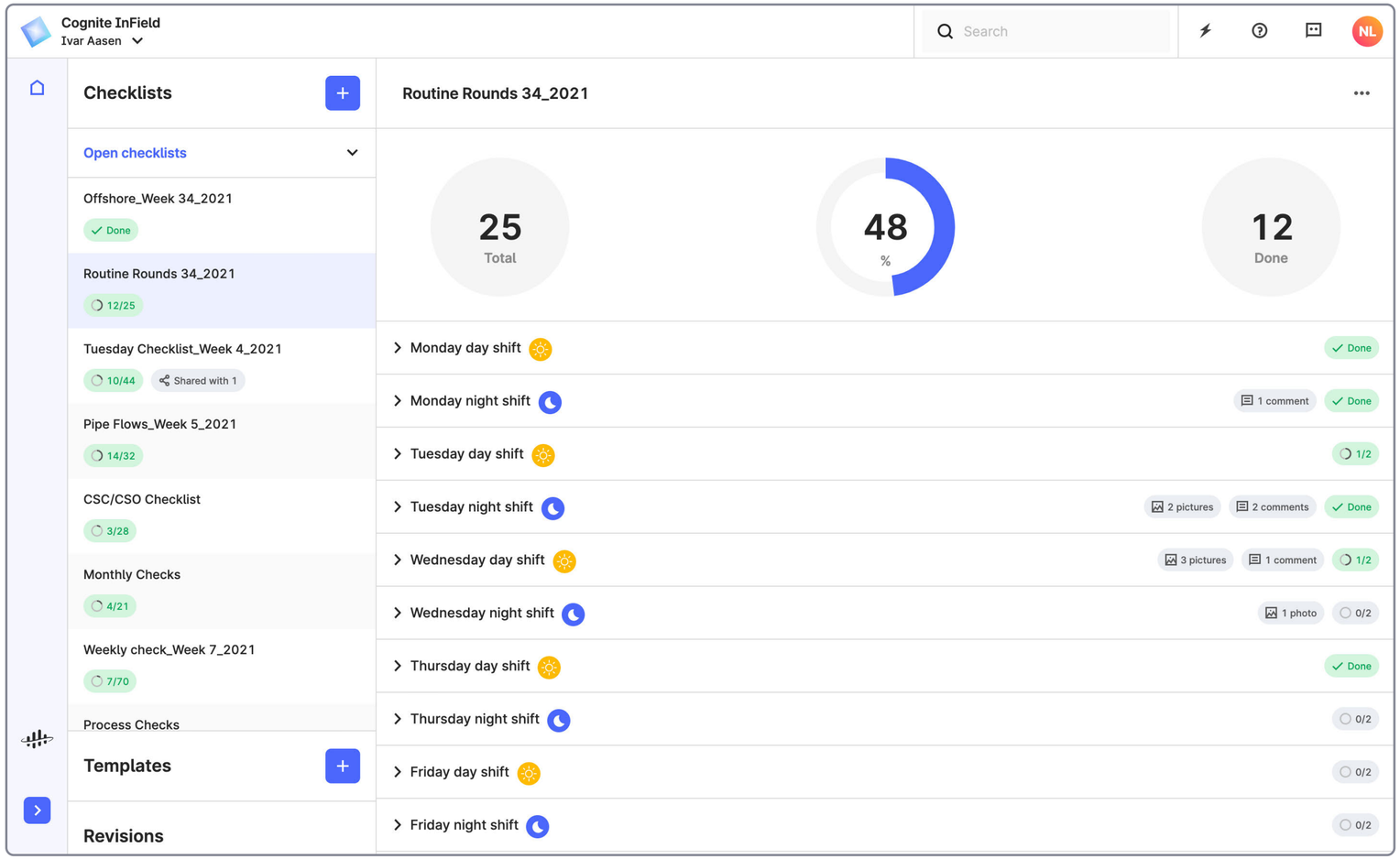
Cognite has developed a suite of software as a service (SaaS) applications that showcase the power of contextualized data in Cognite Data Fusion®. For field workers in asset-heavy industries, Cognite offers InField, which enables field workers to be as efficient as possible by making relevant information available everywhere and by supporting key, routine work processes.

Available on computers and smart devices, InField reduces waste, improves efficiency, and increases safety by optimizing the preparation and execution of day-to-day operations and maintenance activities.

With InField, field workers such as instrument technicians, process operators, mechanics, electricians, and others can:

30–80%

Time saved on maintenance execution



WATCH A DEMO OF COGNITE INFIELD IN ACTION →

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--> Create collaborative checklists. InField integrates with computerized maintenance management systems and supports "one-click" checklist creation based on a work order's object list, eliminating the need for paper checklists. Connected by smart devices, workers can collaborate, view, and check tasks off the lists once completed, improving communication and saving time.

--> Scan tags and access data. With InField, workers can scan equipment tags to access all the contextualized data contained in Cognite Data Fusion®. This includes 3D models, piping and instrumentation diagrams (P&IDs), technical documents, time series, work orders, and more. Easy access to data reduces the need to walk back and forth between the office and the field.

--> Find and navigate to equipment. In addition to scanning tags, InField lets workers search by name to see where equipment is located on 3D CAD models of the industrial installation. This pinpoints the exact location of the equipment and helps workers digitally navigate the surrounding area to see what's connected and marked as areas of interest.

--> Capture and share images in the field. InField's smart reporting capabilities add data and context to field work. Field workers can capture and share images and video in the field for efficient collaboration with colleagues, partners, and third-party suppliers.

--> Troubleshoot in the field. Using InField, field workers can compare real-time data across equipment. Control room operators can also use the app to see the same data and documents that field workers are seeing, which simplifies collaboration.

LEARN MORE ABOUT COGNITE INFIELD →

Cognite InField wins 2020 Red Dot Award for Interface Design

In 2020, Cognite InField was recognized for its innovation and user-friendliness with the 2020 Red Dot Award for Interface Design.

The prestigious international award provides a platform for designers, agencies, and companies from all over the world for the evaluation of design. In line with the award's motto, "In search of good design and creativity," 24 international jurors assessed the entries, examining each piece of work and each brand individually and extensively. They paid special attention to the form, the idea, and the impact. Ultimately, only those projects that convinced the experts in terms of their high design quality and creative achievement received a distinction.

InField stood out among nearly 7,000 creative projects from 50 countries in the Brands and Communication Design category.

"I want to congratulate Cognite as a winner of the Red Dot Award on their success. By winning this distinction, they have proved that their work stands for high design quality. They have come out on top in a strong field of international participants thanks to their convincing performance and deserve to be proud of themselves and of their accomplishment."

Peter Zec, Founder and CEO, Red Dot

Cognite Data Fusion® in action

How Industrial DataOps powers OMV's asset integrity operations framework

Challenge: Extending the lifetime and reliability of assets is one of the main priorities in the oil and gas industry to make operations safer and more sustainable while remaining profitable. As part of that work, many operators are expanding their remote work capabilities.

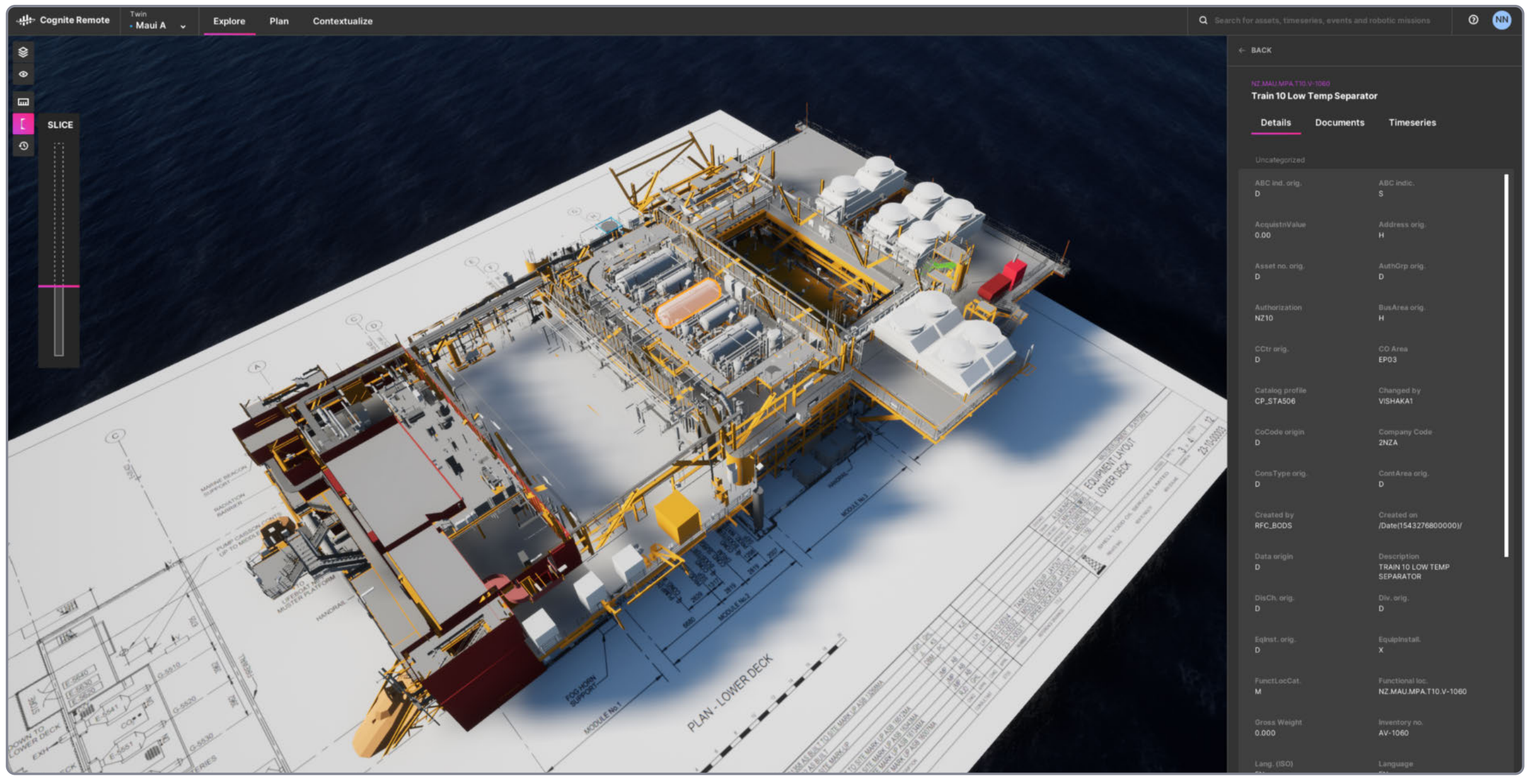
OMV, an Austrian integrated oil and gas producer, is developing a new remote asset integrity operations framework. The requirements for the project all indicated a clear need for a more sophisticated, holistic approach to data collection, processing, and visualization to aid remote inspection, collaboration, training, certification, audits, and precommissioning. This approach to remote asset integrity operations would:

- Reduce the costs of unplanned downtime. As the global cost of downtime rises, the need to maximize uptime has become imperative for OMV to stay resilient in the face of unpredictable market trends.
- Lower the cost of asset condition monitoring, inspection, and maintenance planning. Better visibility of equipment condition, efficiency, and performance enables efficient central planning, scheduling, and dispatching of front-line main-

25%
Reduced planning time

50%
Reduced OPEX

Reduced environmental footprint and HSE exposure



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tenance operators.

- Cut unnecessary maintenance hours and associated costs. Inadequate and inaccessible information about asset condition necessitates costly manual inspections and more frequent maintenance trips.

- Improve procurement and business planning. Easily accessible information helps operators and procurement managers optimize spare parts management for repair and replacement.

- Ensure compliance with health, safety, security, and environmental (HSSE) regulations. Eliminating unnecessary inspection and maintenance trips offshore also reduces safety hazards.

Solution: To provide a complete, actionable understanding of OMV's physical and digital assets and processes, Cognite connected and contextualized information from various disparate systems, including visual information from engineering diagrams, CAD models, 360-degree images, point cloud data, and photogrammetry models. Together, these different data sources create a dynamic 3D model.

Via AI-driven augmentation techniques, the model was further contextualized with geotags, information about scaffolding requirements and inspection checklists, high-frequency time series from individual sensors, and access to all relevant documentation.

Viewable in Cognite Remote →, the dynamic, high-fidelity 3D digital twin makes information about enterprise-wide assets and processes available anywhere. OMV's maintenance and inspection planners and operators can collaborate using Cognite Remote to streamline maintenance planning activities remotely, with no need to travel offshore.

When conducting inspection, maintenance staff and process engineers receive comprehensive work packs with 3D visualizations and files. Using a tablet or mixed reality devices such as Microsoft HoloLens 2, operators in the field can view virtual elements overlaid on physical assets and work orders for operations or training needs.

Impact: With remote asset integrity programs based on Cognite Remote and Cognite Data Fusion®, OMV is well on its way to realizing the vision of managing assets autonomously, backed by an adaptive digital workforce. Cognite's dynamic 3D digital twin, with inspection workflows, elegant mobile and mixed-reality solutions, and seamless integrations with other architectures via open APIs and SDKs, is key to making it happen.

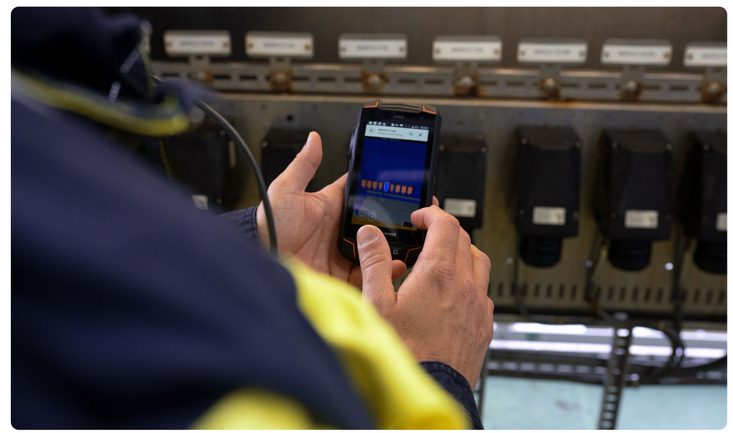
All of OMV's asset integrity operations can now be planned remotely, changing the way OMV's experts work and collaborate:

- Maintenance service staff can reduce the number of trips they take offshore, significantly cutting travel and maintenance costs. When a trip offshore is required, remote, real-time operations with onshore and offshore staff connected for technical support will optimize resource use.

- Mobile devices help offshore operators access data contained in work packs, while mixed reality devices such as HoloLens2 further improve remote technical assistance and asset vendor support, keeping all stakeholders connected whenever a need for troubleshooting arises. This is of tremendous value for certifications, precommissioning, and audits.

As the digital twin provides a single entry point to all relevant inspection data, there is no need to access disparate data sources and applications. Access to contextualized data is now instantaneous.

Sustainability is reshaping how heavy-asset industries operate. Digitalization and digital twins can contribute to more efficient resource use, giving asset-heavy companies the information and tools they need to reduce their environmental footprint.



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How Aarbakke and Cognite are extending the lifetime of CNC machines

Challenge: Aarbakke has dozens of computer numerical control (CNC) machines at its factory in Bryne, Norway. The machines complete complex operations on sometimes rare materials to achieve highly precise product requirements that Aarbakke's customers in the oil and gas industry demand.

Historically, the CNC machines have sometimes been unknowingly operated in a suboptimal way, and there have been no alerts or warnings prior to them breaking down. Issues include high temperatures in coolants or oils, which lead to wear and tear; wrong pH and salinity in the coolant, which can cause corrosion or bacterial or fungal growth; incorrect lube oil consumption; and missed maintenance on the machines.

Aarbakke lacked a master log of these machine alarms, as well as a system to filter out less critical ones. Service managers previously depended on operators to send them a note every time a critical issue occurred. Otherwise the service managers needed to physically go to each individual machine and manually pull a local log to view the alarms.

Solution: Aarbakke and Cognite first liberated data about machine alarms from its source system, ingesting it into Cognite Data Fusion®.

With all data streaming from one place, the developers then created a dashboard that shows an overview of all alarms but also groups alarms by machine and issue. **This helps service engineers pinpoint specific issues and machines and take targeted maintenance actions to address them.**

Aarbakke and Cognite plan to add more functionality to the dashboard in the future, including a feature that lets service managers assign levels of criticality to alarms, ensuring that the alarms they deem most important will always be featured at the top of the list.

Impact: Improved monitoring of operational parameters and the ability to look at records of alarms and warnings centrally will reduce the number of breakdowns and extend the lifetime of the machines. Beyond that, collecting cleaned, contextualized data about alarms will help drive Aarbakke toward a future in which the company can predict potential failures before they happen.

Aarbakke estimates that the dashboard will cut service costs by 20-30%, reduce downtime, and avoid unplanned stops due to mechanical reasons.

20–30%
Reduced service costs

Reduced downtime and unplanned stops

Timely alerts ordered by priority

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How Cognite Data Fusion® helps grid operators prevent transformer failure

Challenge: Transformers are some of the most expensive and critical components in a power grid. Often weighing in at more than 200 metric tons, these massive devices are situated at critical parts of the grid, transferring electricity between alternating-current circuits and increasing or decreasing the voltage as necessary.

Grid operators sometimes experience transformer failure. These events can lead to power outages for consumers and production losses for power companies. In the worst-case scenario, a malfunctioning transformer can catch fire and even explode. Repairing or replacing a malfunctioning transformer is both expensive and time-consuming.

Cognite has worked with Statnett, the Norwegian transmission system operator, to improve access to data and knowledge on how best to conduct maintenance on transformers.

Today, Statnett is responsible for hundreds of transformers, and the company experiences about one malfunction a year. The transmission system operator conducts regular maintenance of the transformers, and also invests in replacement components to ensure that power can quickly be restored in the case of an outage.

Solution: Statnett worked with Cognite to liberate information about transformers from its source systems, including temperatures, loads, dissolved gas analyses, technical specifications, and inspection logs, and ingest it into Cognite Data Fusion®.

With access to all the data relevant to transformers in a single location, the development team was able to calculate a transformer health index and scale it across all the transformers in the power grid. That health index was then visualized in a dashboard, giving Statnett's engineers the ability to monitor its entire fleet of transformers at a glance and see which components should be prioritized for maintenance.

Impact: The health index helps Statnett make data-driven decisions about how to plan its transformer maintenance activities.

Each transformer failure costs society at least $5 million. **Statnett has set a goal of reducing the chance of failures by 20-50% over the next five years, which in the short term will save the company about $2 million a year.**

$2M
In estimated annual savings

Data-driven maintenance planning

Reduced risk of transformer failure

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Conclusion

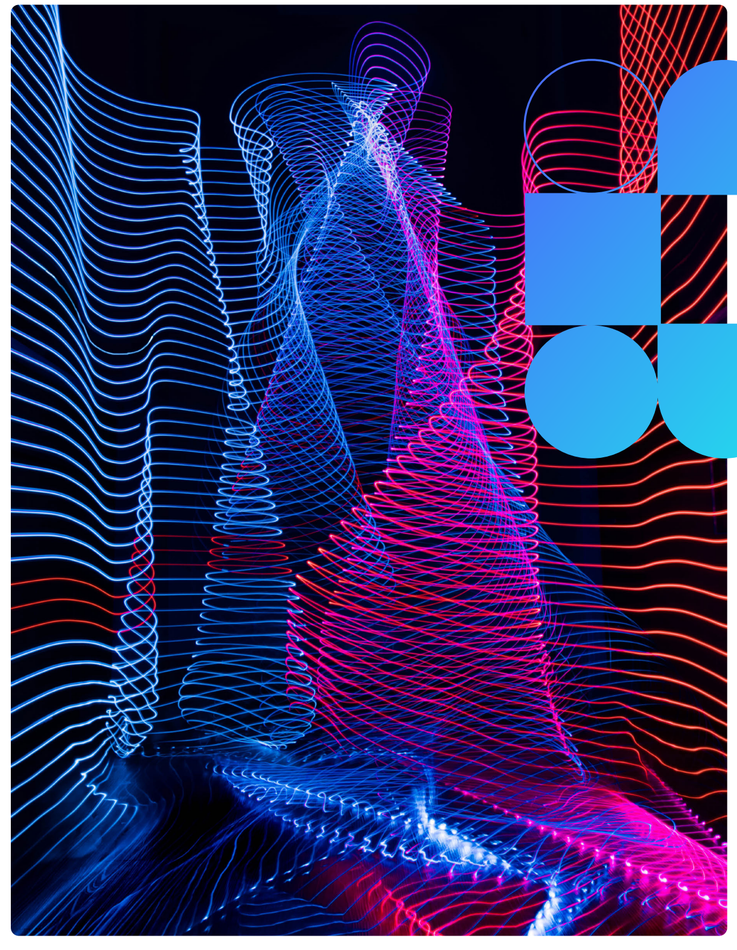
Successful maintenance organizations today are recognized by their strong leadership, competency, and maintenance management practice. **Digital transformation will make these qualities even more important.**

Realizing value from the maintenance management process will require asset-heavy companies to change how they work. Organizations, processes, and technology must be updated — and all of it must come together to transform the status quo. **Industrial DataOps can be the catalyst for this transformation.**

The fastest path to tapping into the value potential within maintenance and integrity starts with getting the right data with the right context to the right users at the right time for the right problem. **Industrial DataOps can help companies make their data available, usable, and valuable.** It adds context to every step of the maintenance management process, whether you are just starting your digital journey or looking to build on your data-driven competitive advantage.

Calendar-based maintenance will remain an important component of a robust maintenance strategy. With Industrial DataOps, companies can augment that strategy with predictive maintenance, combining subject-matter expertise with data-driven capabilities.

Extend the lifetime of your assets with Cognite Data Fusion®, the leading Industrial DataOps platform.



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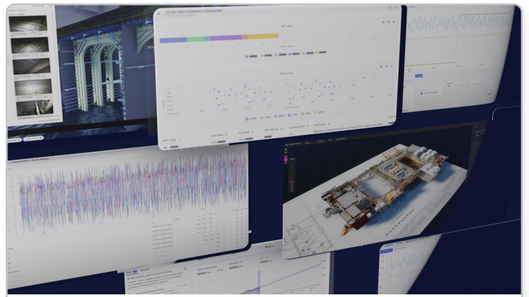
Want to know more about our product?

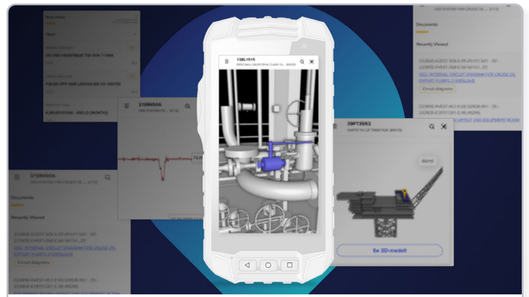
Explore more insights from Cognite



PRODUCT TOUR

Learn from Cognite customers and product managers how Cognite Data Fusion® simplifies and streamlines the data experience of a subject matter expert.

WATCH NOW →



CUSTOMER STORIES

Discover how Cognite Data Fusion® makes data more accessible and meaningful, driving insights that unlock opportunities in real-time, reduce costs, and improve the integrity and sustainability of your operations.

GO TO STORIES →

ANALYST REPORT

Customer interviews and financial analysis reveal an ROI of 400% and total benefits of $21.56M over three years for the Cognite Data Fusion® platform.

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BLOG

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