COGNITE

CASE STUDY

Industrial DataOps Lays Foundation for Predicting Oil Quality at a Major National Oil Company

Cognite Data Fusion solved the following challenges to improve the quality of separated oil:

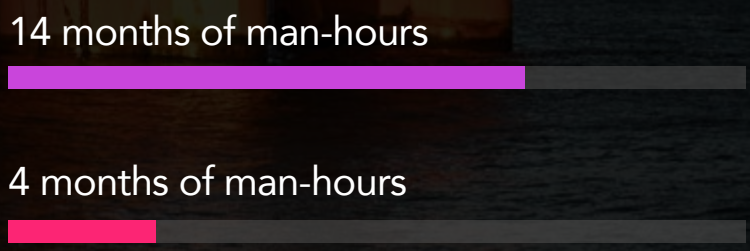
- Access to and sufficient analysis of data
- Building an analytical model that incorporates both the governing physical phenomena of the separation process and a data model of the separation facility
- Operationalizing the solution into production
- Real-time monitoring and governance of the production model

SECTION ONE

Industrial Data Operations: Built for Scale

By leveraging Cognite Data Fusion, initially for one oil train at a large separation facility, a major national oil company ('the National Oil Company') was able to improve the quality of separated oil, resulting in over $11.5 million gains.

Time to deploy one solution, with and without Cognite Data Fusion

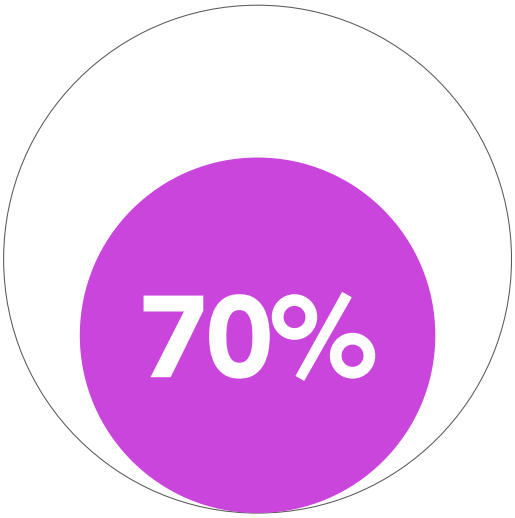


Quality of Oil Separation Solution

As a part of their continuous production optimization efforts across their fleet of assets, the National Oil Company focused on the challenge of crude oil fields struggling to meet the export specifications for oil quality due to too-high water content.

To solve this challenge, Cognite delivered a live, physics-guided machine-learning model to identify bad actors causing poor oil separation with recommendations for how to improve separation.

To build the solution for one oil train, more than 350 sensors were evaluated, with over 100 sensors being used in the final solution.



Time to value was decreased by 70% for the initial asset, making an immediate impact on the business.

Deploying for proof, building for scale

In line with their broader efforts of digital transformation and approaching solution creation from the foundational data layer up, the National Oil Company was able to realize immediate value with the first solution deployment, achieving a 70% reduction in time to value. It will continue to realize the exponential impact of its investment as it solves the problem of scale.

By laying the foundational data model for scale in Cognite Data Fusion, the National Oil Company will quickly deploy the quality of oil separation solution—first to 4 additional oil trains, and then to over 35 separation facilities.

Building AI and ML solutions for production optimization on top of Cognite Data Fusion allowed the National Oil Company to operate as efficiently as possible, maximizing production and reporting transparently on their sustainability progress to regulators, the financial sector, consumers, and potential employees.

The efficiency gains can be seen at each step of the process from raw data to creation of the live, physics-guided machine-learning model deployed into production.

CDF value story

COLLECT, INTEGRATE, ACCESS

Without CDF

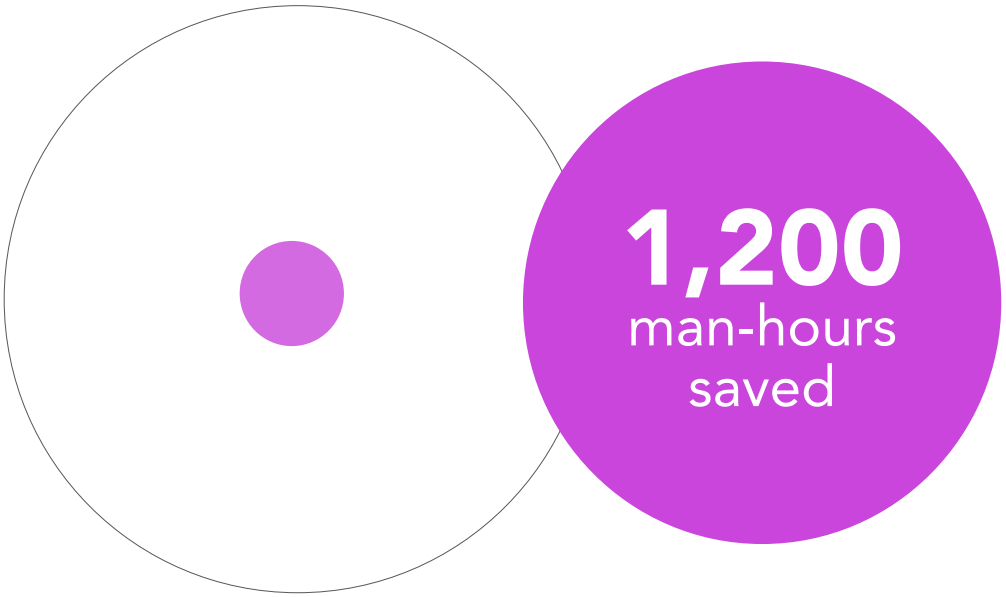
Set up infrastructure:
Solution architects set up on-premises compute service (openshift), a time series database (influx db) and visualization service (Grafana)

Security approval:
Data owners needed to be convinced that the data will be handled securely and motivated by a valuable use case

With CDF

Set up infrastructure:
Solution architects set up Cognite Data Fusion with all of its resources

Security approval:
Cognite Data Fusion documentation was provided to the National Oil Company for security approval



COLLECT, INTEGRATE, ACCESS

Without CDF

Access:

Set up oauth for the on-premise infrastructure

The National Oil Company's security department worked with multiple presentations about security and authentication to find a solution that the Customer's stakeholders approves

Ingest:

created custom OSI PI data extractor for time series database

Metadata was hard-coded

Documents were not ingested; they were hard-coded

With CDF

Access:

Cognite supports multiple forms of authentication easily integrated with Cognite Data Fusion

Established methods for security make for trust in authentication

Ingest:

Cognite already has extractors available for many data sources, e.g. a OSI PI extractor that is robust and easy to setup

CONTEXTUALIZE AND UNDERSTAND

Without CDF

Tag and repair
No options existed for tagging and repairing. Done manually in the use case phase

Contextualize:
Negligible contextualization in the custom solution

Visualize:
Grafana was used to visualize and verify that data was available

With CDF

Tag and repair:
Utilized metadata, asset hierarchy, relationships nd templates, data quality monitoring in Cognite Data Fusion

Contextualize:
Cognite contextualization connects data sources together for easy exploration and use

Visualize:
Visualization is available out of the box

16+
hours time savings

DEVELOP AND DEPLOY

Without CDF

Evaluate/data exploration:

Stacks of hard-copied papers of P&IDs and P&FDs were used to identify tags, and a dashboard was used to verify data together with SMEs

There was no good place to store the contextualization, which was all done in configurations specific to the use case. similar to a large excel spreadsheet with mappings

Siloed data and Output of data exploration done in an Excel spreadsheet, including configuration files inside the source code of the use case

With CDF

Evaluate/data exploration:

Data scientists and customer SME work together to find the required data for the use case using features including P&ID parser to explore data and set up templates to keep track of data

DEVELOP AND DEPLOY

Without CDF

Preprocessing and preparing of data:

Needed to establish methods for preprocessing specific to the infrastructure available

Analyze:

Model created using Python code and open source libraries

Iterative process of tuning the model and determining feature engineering

Feature engineering based on governing physics

With CDF

Preprocessing and preparing of data:

Raw data is transformed to a dataset to be used for the use case

Cognite Data Fusion functions are utilized, with easy data-fetching and established methods making this process much faster

Analyze:

Model created using Python code and open source libraries

Iterative process of tuning the model and determining feature engineering

Feature engineering based on governing physics

Collaboration between Cognite SMEs and National Oil Company SMEs

DEVELOP AND DEPLOY

Without CDF

Deploy:
Docker containers and running the containers on openshift (server)

More labour-intensive because it required involvement from solution architects from Cognite and the National Oil Company

Special case: deployment had to be scheduled because it was on-premises and needed assistance from the National Oil Company IT

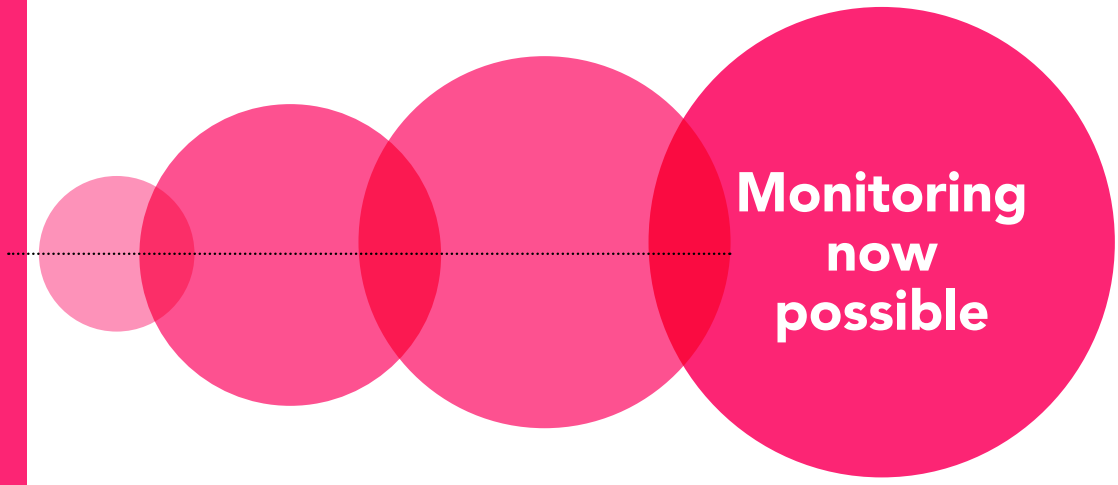
Cognite SAs spent time setting up test environment in Norway

With CDF

Deploy:
Cognite Functions (based on open functions as a service)

No need for solution architects to be involved in cloud hosting

	Without CDF	With CDF
MONITOR AND GOVERN	Not previously possible	Alerted when the model does not run or produces errors Alerted when the data source is down Alerted when front end is down
SCALE	Not previously possible	Oil quality separation solution scaled across the fleet of assets



SECTION THREE

Solution and value realization

Separated oil quality use cases deployed at the National Oil Company needed to be architected to run live in production, at scale, before the first line of code was written.

By taking the foundational approach to solution deployment with Cognite Data Fusion, the National Oil Company now has the ability to quickly scale this solution across its entire fleet of assets, and quickly. **Industrial DataOps delivers exponential value in production optimization**

The initial deployment of Cognite Data Fusion for just one oil train at a large separation facility delivered a 70% time reduction, resulted in gains of over **$11.5 million** for the National Oil Company, by improving the quality of separated oil.

The second phase—scaling to four additional oil trains —brings potential gains of over **$75 million**. Finally, the ultimate value is set to be realised after the final third-phase scaling of Cognite Data Fusion to the full fleet of separation facilities.

This will lead to additional potential gains of over

$500 million.

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