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Oil & Gas Software
The Path to Predictable Operations in an Unpredictable World

Executive Summary

The oil and gas industry lives in a state of constant volatility. Prices surge in weeks – something we once again witnessed in 2026 as strikes on Iran caused 45% increase in Brent crude.

Naturally, when prices rise, so does the cost of every unplanned downtime hour. That's where operations make the difference. Predictable operations let you respond to demand jumps and accelerate production when the market rewards it. Unpredictable ones keep you reactive: always in recovery mode, never in control.

Our clients approach us with 5 common operational problems across upstream, midstream, and downstream facilities. For each problem, we explain the true cost, show how specialized software can help, and share real examples of how Exoft has made a difference.

Vice Presidents of Operations

responsible for uptime and production goals while managing aging assets and understaffed teams. You absorb the commercial consequence of every unplanned outage.

Asset Integrity Managers

who require safety-critical decisions on inspection cycles, risk rankings, and remaining life estimates, but have inconsistent data and outdated inspection records.

Chief Technology Officers

looking to modernize after inheriting years of undocumented legacy systems and evaluating where modernization delivers actual ROI.

Transformation Leads

delivering change inside organizations where field engineers and operations staff are the end users. A solution they won't adopt is not a solution.

Oil & Gas Today: The Story of Constantly Managing Uncertainty

Geopolitical conflicts, trade disputes, sanctions, and even weather conditions keep changing regulations, demand in oil and gas, and the supply chain, giving operators little warning and even less control.

Early 2026 made this clear. The EIA forecast crude at $58 per barrel in early February. Late February pushed it to nearly $74. In March, it hit a record $120 after a conflict stopped flows through the Strait of Hormuz.

As it usually goes, prices rise, and so does the cost of every downtime hour. In 2022, when crude peaked at $115/bbl, annual downtime costs reached $149M per facility. According to Siemens, back then, the increase reached a staggering 76% increase, despite companies investing heavily to cut failures by 25%.

Aging Infrastructure Narrows the Window to Act

Oil and gas assets are designed to last a long time. On average, offshore rigs have a useful lifespan of 20-30 years, while gas pipelines are designed to operate safely and productively for about 50 years.

However, half of all onshore oil and gas infrastructure was built before 1970 for different throughputs, pressures, and inspection standards.

Many of them will soon reach the end of their operation. The ASCE's 2025 Report Card graded U.S. energy infrastructure at D+, citing pipelines that are “aging beyond their intended design lives.”

When aging infrastructure meets a spike in demand, the unforgiving laws of physics come into play, too. Corrosion accelerates under pressure cycling, metal fatigue compounds, and unplanned failures follow. Operators who handle demand spikes well are those who know exactly what their assets can sustain (and run them accordingly).

The Case for Predictable Operations

Best-performing oil and gas operations have long since shifted from reactive to proactive, using software for real-time monitoring, AI-driven analytics, and predictive maintenance. This tendency will continue to grow each year.

Per Gartner, global IT spending in the oil and gas market totaled $42B in 2024, rising to $44B by 2025. Also, at least 20% of IT expenditures will go to AI and gen AI budgets in 2026.

The cost of staying reactive:

$200-600K

lost per hour of unplanned downtime (crude price-dependent)

Siemens AG

37%

of energy wasted in refining due to outdated tech and monitoring issues

IndustryWeek & Emerson

The payoff of going predictive:

5-15%

reduction in facility downtime and 20% increase in labor productivity

Deloitte

77%

of potential downtime reduction with AI-enabled proactive maintenance

BCG

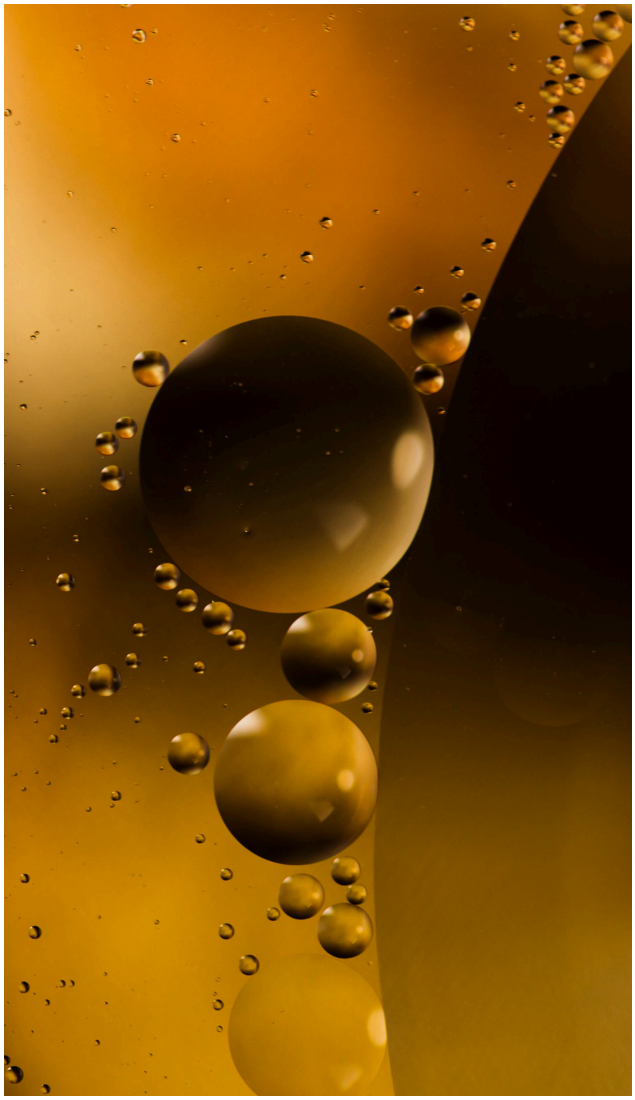
5 Operational Problems That Software Solves (And What They're Costing You)

Problem 1. Production Inefficiency

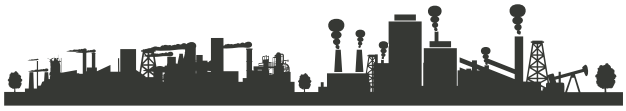
Wells, pumps, and compressors operate at peak performance for far less time than most operators assume. The inevitable decline is built into the physics. The IEA analyzed 15,000 fields and found that conventional oil wells decline at 5.6% per year after peak, while gas declines at 6.8%. In a hopefully imaginary scenario in which all companies ceased performance remediation investments, global oil production would fall by 5.5 million barrels per day each year.

Thankfully, most of the upstream investment does not cease. Yet it goes toward keeping existing fields producing, rather than discovering new ones. Conventional primary and secondary recovery methods alone leave 60-80% of every barrel in the ground. Even with enhanced recovery techniques, 40% or more oil typically remains unrecoverable.

$200B	annual revenue shortfall from offshore platforms running at only 77% of maximum production McKinsey
90%	of all upstream investment goes toward offsetting existing production losses, not meeting new demand IEA



Connectivity and digital analytics could be the answer we're all looking for. This way, offshore operators can reduce costs by 20-25%/bbl. Implementing digital solutions across upstream operations could unlock $250 billion in value by 2030.



Software That Solves This

Well Performance Analytics

- Underperforming well identification across portfolios
- Production trend modeling and decline forecasting
- Data-driven intervention prioritization

Production Optimization Platforms

- Real-time well, pump, and compressor performance modeling
- Automated decline rate analysis and output adjustment
- Replacement of manual spreadsheet workflows with live feedback loops

EOR Injection Monitoring

- Real-time CO_2, water, and steam injection rate tracking
- Sweep efficiency measurement and optimization
- Early underperformance detection in tertiary recovery programs

Artificial Lift Monitoring

- Real-time ESP, PCP, and gas lift performance tracking
- Early detection of efficiency losses before production impact
- Automated alerts on deviations from baseline performance

Voices from the Field

> *My customer conversations tell me technology and service execution are key to maximizing the value of their assets."*

Jeff Miller, Chairman, President, and CEO of Halliburton

Exoft's Expertise

Client: Digital oilfield analytics provider, from Western Europe.

Problem: Well data was scattered across databases and not integrated. Production data was reconciled manually in spreadsheets. There was no real-time visibility across distributed wellsites.

Solution: We implemented a unified well data platform with centralized production monitoring dashboards, ESP/PCP analysis, production scheduling, well benchmarking, and HQ-to-field communication.

Outcome:

- Hours of data coordination reduced to minutes
- Underperforming wells get on the maintenance radar faster
- Acquisition of the platform by a leading US-based Artificial Lift company

Our Oil & Gas Expertise

See how we work across upstream, midstream, and downstream

Production Software Case Study

from manual spreadsheets to real-time well data collection

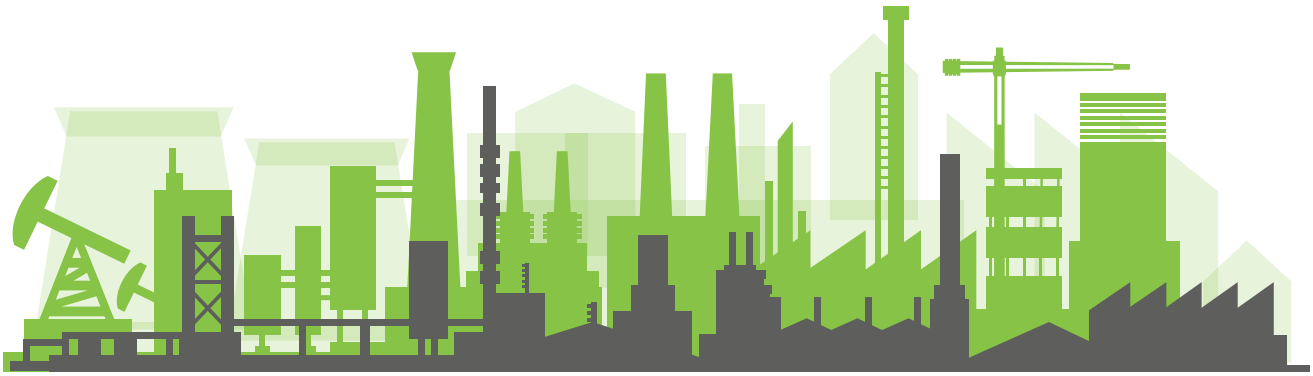
Problem 2. Equipment Failures and Unplanned Downtime

Pumps, compressors, valves, and turbines fail without warning, causing shutdowns that cost more per hour than companies spend on prevention in a month. For instance, BP's production losses amount to $10M if a single pump fails, resulting in unplanned downtime. But throwing more budget at maintenance isn't the obvious fix it appears to be.

Lloyd's Register, applying its asset performance management platform across FPSO operators, found that up to 500 manhours per piece of equipment is spent on maintenance tasks that had zero statistical correlation with reduced failure or better uptime.

The real impact is spending on the right maintenance activities. That requires knowing which assets are degrading, at what rate, and how that relates to failure probability. Manual inspection cycles and time-based schedules cannot provide that.

In one MDPI case study, the use of IoT and ML-based predictive maintenance reduced downtime by 20% and increased machine lifespan by 15%. Shell's deployment of AI-based predictive maintenance exacerbates the impact: they cut unplanned downtime by 35% and slashed maintenance costs by 20%.



Software That Solves This

Predictive Maintenance Platforms

- Continuous sensor data monitoring & alerting
- AI/ML-based failure prediction and early warning
- Maintenance scheduling based on actual asset condition

Condition Monitoring Systems

- Real-time vibration, temperature, and pressure tracking
- Anomaly detection against established performance baselines
- Remote monitoring of unmanned and offshore assets

IoT Asset Health Monitoring

- Equipment health dashboards for each asset
- Integration with SCADA and DCS systems
- Automated work order generation on threshold breach

Voices from the Field

> *The high cost of downtime increasingly constrains industrial businesses in an already uncertain landscape. This encompasses both direct costs like wasted production or spare parts, and indirect costs like reputation and morale."*

Virve Viitanen, Head of Global Customer Care at ABB's Motion Services

Exoft's Expertise

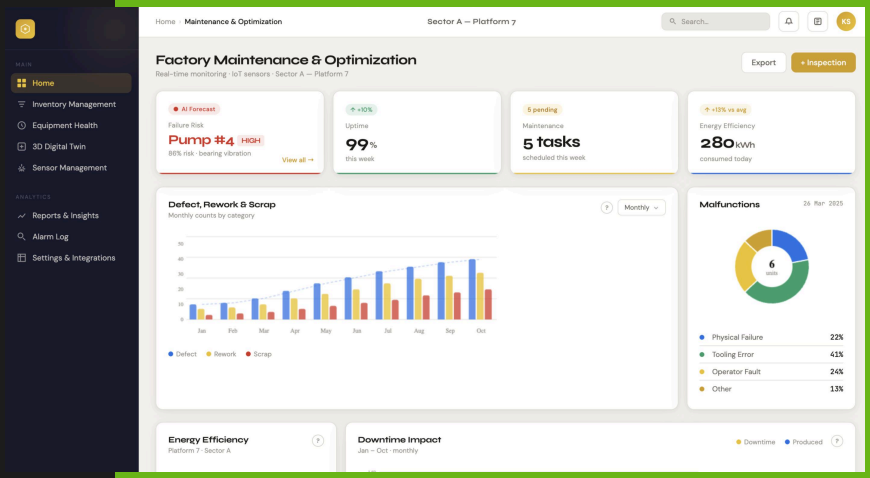
Client: Middle East tech startup, developing an enterprise oil rig monitoring platform

Problem: The client approached us with an unscalable, undocumented codebase. IoT data lacked a monitoring layer, alarm logic, and a proper visualization of equipment condition.

Solution: We implemented a real-time monitoring platform with a threshold-based alarm system, a 3D digital twin interface, live sensor data, time-series data filtering, and dynamic forms for field engineers

Outcome:

- 30% decline in downtime rates
- 15% less cost spent on reactive maintenance
- A major investment and enterprise partnership with the world's largest O&G company, mid-development



Our Oil & Gas Expertise

Predictive maintenance and asset monitoring solutions

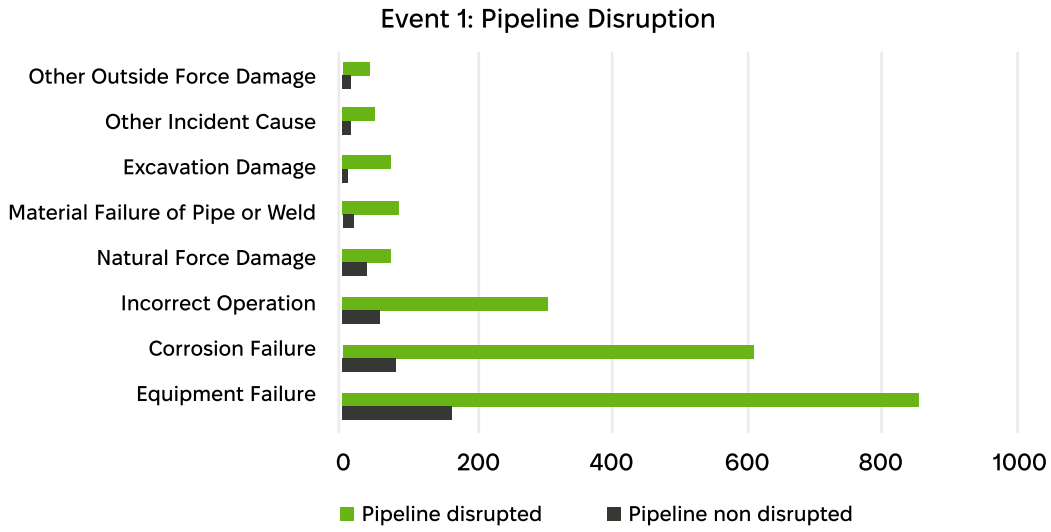
Oil Rig Monitoring Case Study

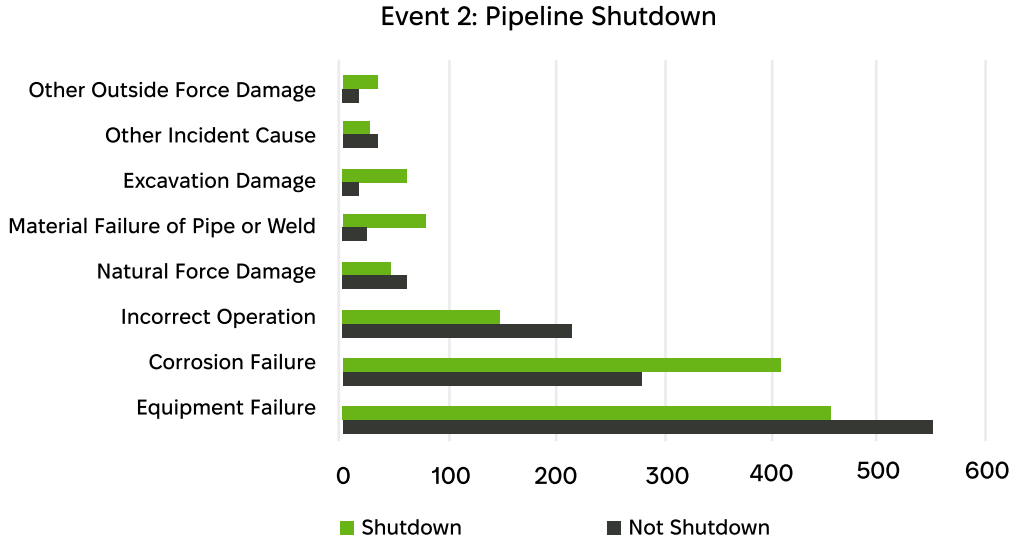
cutting response time with live performance visibility

Problem 3. Pipeline Leaks and Integrity Risks

Over 3.5 million km (or 2.1 million miles) of pipeline infrastructure move oil and gas across the globe. Half of it dates back to before 1970, and much of that infrastructure is now operating past its intended design life. Corrosion, material failure, and equipment issues don't help prolong that pipeline's lifespan. These issues account for 55% of all U.S. pipeline incidents, with the highest concentration on lines laid in the 1950s and 1960s.

The consequences show up in maintenance checks, lost production, environmental exposure, and fines. Corrosion costs the global pipeline industry $20 billion per year, according to the Australasian Corrosion Association (ACA).





Equipment failure may not stop at disruption. It could shut pipelines down

MDPI (peer-reviewed)

What makes these failure modes costly is that none of them is a single event. They develop over time, begin with subtle early warning signs, and are routinely missed by traditional inspection methods.

- Corrosion develops slowly, but is accelerated by aggressive environments (CO2, H2S, microorganisms, chlorides). In 10 years, corrosion defect depth can grow by 27–34%.
- Stress corrosion cracking is faster and harder to catch, causing sudden catastrophic fracture.
- With material fatigue, damage slowly accumulates before a crack even forms, so the pipe can be compromised long before any visible sign appears.

What starts as surface rust or a hairline crack ends in leaks, lost production, and million-dollar fines.

$9.6 million fine for violations of pipeline safety, which caused a crude oil spill in the Gulf of Mexico

E&E

Keystone Pipeline leak released 556K litres (146 gal) of oil on farmland

Calgary Herald

Corrosion mitigation methods, including pipeline monitoring and predictive software, could reduce costs by 15-35%, representing billions annually. ILI tools catch what's inside the pipe.

Software can pick up what they miss: external corrosion in unpiggable lines, geohazard stress, and third-party damage. Plus, with real-time monitoring, you can catch warning signs long before they affect integrity.

Software That Solves This

Corrosion mitigation methods, including pipeline monitoring and predictive software, could reduce corrosion costs by 15-35%, representing billions annually. ILI tools catch what's inside the pipe. Software can pick up what they miss: external corrosion in unpiggable lines, geohazard stress, and third-party damage.

In-Line Inspection (ILI) Data Platforms

- 3D pipeline visualization with component-level anomaly mapping
- Corrosion, crack, and geometry defect classification and prioritization
- Integration with geographic and environmental risk data

Pipeline Integrity Management Systems (PIMS)

- Centralized tracking of inspection history, anomaly records, and risk scores
- DNV- and ASME-compliant integrity assessment workflows
- Corrosion growth modeling and remaining life estimation

Methane & Emissions Monitoring Software

- Continuous tracking of vented and fugitive emissions by segment
- Regulatory reporting against EPA, PHMSA, and IEA requirements
- Identification of high-emitting assets for targeted intervention

Voices from the Field

> *"Very often, the damage [of pipelines] is done by workers who are either unaware or ill-informed about the conditions they are digging in."*
>
> José Luis Pallarés, Senior Risk Consultant, Liability, at Allianz Commercial

Exoft's Expertise

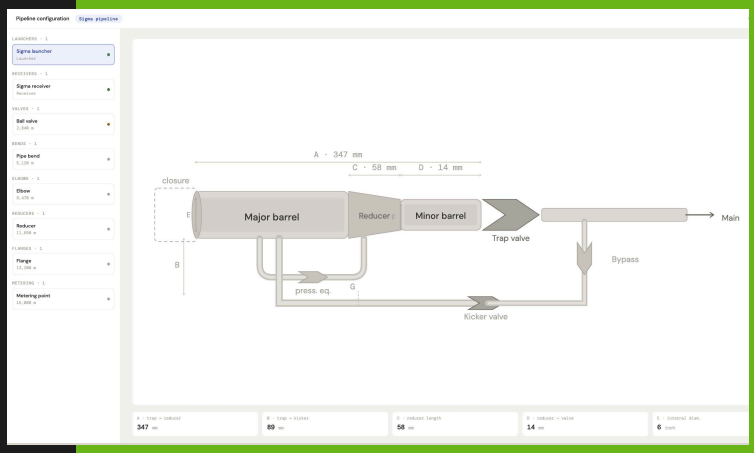
Client: Saudi Arabian asset management software provider for large oil & gas businesses

Problem: A data-heavy pipeline management system had no usable interfaces, business intelligence visualizations, or pipeline models. ILI data and corrosion reports existed but were inaccessible to the people who needed to act on them.

Solution: We designed and integrated interactive 3D pipeline models, DNV-compliant ILI analysis interface, data visualizations, and a pipeline configuration module with validation and health indicators.

Outcome:

- 10-15 years – estimated increase in pipeline useful life after implementation
- 30%+ operational productivity boost
- A partnership with the world's largest oil & gas operator



Our Oil & Gas Expertise

Pipeline integrity & PIMS software development

Pipeline Integrity Case Study

visibility into pipeline health, from corrosion to cracks

Problem 4. Fragmented Data and Disconnected Systems

Many oil and gas companies run a mix of legacy systems, including SCADA, historians, ERP, drilling software, and inspection databases. Many of them aren't cross-integrated. Especially when we talk about oil and gas companies with multiple departments and geographically dispersed units.

Peer-reviewed reports consistently mention data silos as the most impactful challenge in upstream operations (along with data quality, standardization, and governance). The scale of the problem is staggering: a single well can generate over 10TB of data per day, and most of it goes unseen and unused by engineers, who take actual corrective and preventive actions. Maintenance records remain poorly catalogued or, worse still, on paper.

In oil & gas procurement, there is a phenomenon of "one item, multiple codes". The same component may carry six coding variants across contractor systems, and 12% of delivered materials don't match their order parameters.

3-5%	material waste directly attributable to data fragmentation MDPI (peer-reviewed)
98.7%	of maintenance alerts had missing or incomplete technical location data in one case study MDPI (peer-reviewed)
40%	of management time consumed by data coordination across fragmented systems and contractors MDPI (peer-reviewed)

Applied properly, advanced analytics can yield 30-50x ROI within a few months of implementation on O&G production assets. More importantly, a coherent data layer is the prerequisite for every AI initiative the industry is now pursuing.

Software That Solves This

Unified Data Platforms

- Single source of truth across engineering, operations, and maintenance data
- Real-time data ingestion from SCADA, DCS, ERP, and IoT sensors
- Elimination of manual reconciliation between systems

Integration Middleware & API Layers

- Connects legacy historians, ERP, and field tools without full system replacement
- Enables real-time data flow across previously isolated systems
- Typically, the lowest-cost, highest-ROI first step toward a unified data architecture

Master Data Management (MDM) solution

- Standardizes equipment codes, material catalogs, and asset identifiers
- Removes conflicting records in procurement, maintenance, and operations
- Source of truth for every asset, material, and supplier in the organization

Voices from the Field

> *"The tool that I want is one that brings my plant information together in a common platform that allows me to quickly get what I need in seconds and have confidence in what AI is giving me is correct."*
>
> One Reliability Engineer

Exoft's Expertise

Client: European oilfield software provider and Middle East asset monitoring startup

Problem: One client relied on SQL/NoSQL databases and manual spreadsheet reconciliation. Another had no real-time visibility across fields, IoT data with no monitoring layer or alarm logic.

Solution: For both, we created unified data platforms (with a custom architecture that allows the client to scale). The solutions had centralized dashboards, real-time performance indicators, threshold alarms, and compliance-ready records.

Outcome:

- Cut data coordination from hours to minutes
- Ability to scale data infrastructure to other assets

Our Oil & Gas Expertise

Data integration & unified operations platforms

View All Oil & Gas Case Studies

See how we have solved this for other operators

Problem 5. Insufficient Root Cause Analysis (RCA)

Equipment failure is rarely an isolated event. When an asset goes down, your immediate priority is to get it back online. Yet restoration alone won't answer the more important question: what systemic vulnerability made it possible in the first place? Without root cause analysis ingrained in your procedures, a one-time failure can quietly become a chronic, repeating problem. In the high-pressure, high-temperature realities of oil and gas operations, that pattern puts your team's safety on the back burner.

DNV identifies three root cause levels. Yet, pipeline incident data warrants a fourth: environmental roots. These define the impact of forces outside human control.

1. Physical roots: design deficiencies, material defects, manufacturing flaws, service life anomalies.

Pipeline incident data points to a consistent set of recurring causes. In the last ten years, the most common physical causes in Europe were corrosion (25.7%), ground movement (19.3%), and construction defects (17.5%).

2. Environmental roots: natural forces, ground movement, geotechnical activity

In the Canadian TSB data, geotechnical, hydrological, and environmental factors were the single largest cause category at 35% of all accidents. Across those, landslides are the dominant natural cause (61.5%), followed by earthquakes (23.1%), lightning (7.7%), and flooding (7.7%).

3. Human roots: factors that caused or contributed to the failure

90%	of pipeline accidents occur due to human factors and operational disruptions MDPI (peer-reviewed)
ISO 14224:2016	now places greater emphasis on human error as a failure cause than its 2006 predecessor

4. Latent roots: hidden organizational or procedural failures that made the human error possible

58%	of fatal incidents could have been avoided simply by following existing life-saving rules JPT
1 in 3	O&G accidents involved failure to correct a known problem, a common procedural mishap Coventry University/IOGP

Software That Solves This

A peer-reviewed PLOS ONE analysis of 1,187 severe oil and gas accidents found that human error was the dominant trigger across refineries, tankers, and pipeline networks. Software that tracks what happened, why it happened, and what was done about it is the only durable fix. That means accounting for physical causes, as well as human factors and the latent organizational conditions that quietly set the stage for failure.

Computerized Maintenance Management Systems

- Centralization of maintenance records, inspection logs, and failure histories
- Single data foundation on equipment age, past repairs, and work orders
- Elimination of paper records and fragmented databases

Failure Analysis & RCA Platforms

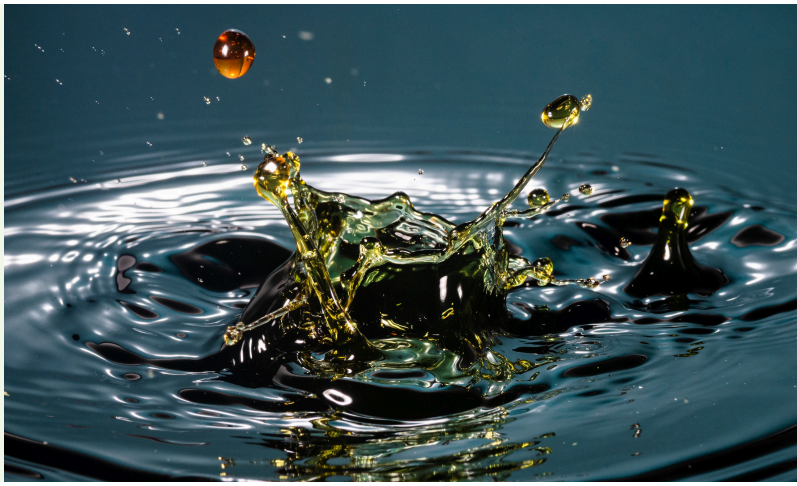
- Digital workflows for catching failure evidence and cause-and-effect analysis
- Corrective action documentation
- Institutional knowledge retention across field teams

Process Safety & Incident Investigation Software

- Support for bow-tie analysis, fault tree analysis, and failure modes and effects analysis
- Mapping of latent organizational and procedural failures
- Risk registers and operating procedures

Voices from the Field

> *"A systematic approach to safety over time is paying off. We believe close collaboration with suppliers and shared learning in the industry is important for our continued safety improvement effort."*
>
> Anders Opedal, Equinor CEO



Exoft's Expertise

Client: A US & Singapore-based artificial lift consultancy company

Problem: The aging root cause analysis platform was written on a deprecated tech stack. There was no mobile access for field engineers. The DIFA documentation workflow was inconsistent.

Solution: Rebuilt DIFA platform: structured RCA documentation, incident visualization, image-based search, automated reporting, mobile access

Outcome:

- 50% faster load speed
- 2x app scalability
- ESP failures, root causes, and component lifecycles tracked in one auditable database

Our Oil & Gas Expertise

RCA & maintenance optimization software

RCA Case Study

Rebuilding the platform that tracks why ESPs fail

Why Exoft

Exoft has built across the full O&G stack: upstream well analytics, midstream pipeline integrity, and downstream asset monitoring. That domain knowledge shapes how we architect, design interfaces, and handle compliance requirements from the start.

We believe that oil and gas companies don't benefit from generic enterprise software with an "energy skin" applied. They need tools built by engineers who understand that a 3D pipeline model must link to a specific corrosion anomaly record, or that an alarm system must survive a 3G connection on a remote wellsite in the Permian Basin.

Our Edge:

- Our teams are very familiar with pipelines, wells, rigs, inspection protocols, and compliance standards.
- We handle everything from system architecture to user-friendly interfaces, API integration, and ongoing support after deployment.
- We build our solutions in accordance with standards such as DNV, PHMSA, ISO 14224, and others.
- Our systems can grow smoothly from managing a single asset to supporting an entire enterprise without needing a redesign.

The problems described in this whitepaper are solvable.

If you recognize your operations in any of them,
the next step is a conversation.

Book a discovery call

Talk to Us!

contactus@exoft.net

Sources

Sources are listed in order of appearance. All URLs verified March 2026.

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