CSE ICON

OIL & GAS SOFTWARE ESSENTIALS:

A PRACTICAL GUIDE TO ASSESS AND OPTIMIZE YOUR TECH STACK

INTRODUCTION:

In the oil and gas industry, technology investments are rarely small. From enterprise-level SCADA systems to sophisticated production analyticsplatforms,companies spend millions on software to boost efficiency, safety, and profitability.

This kind of spending is well-justified in light of the integral role software often plays in daily operations, as well as the potential benefits it can provide at all levels, from employee productivity to company revenue and margins. However, it also creates risk and raises nagging questions:

- Do we have the right software?
- Are we paying for software we don't need?
- Are we missing something that could deliver game-changing benefits?
- Are we using our current software optimally to maximize impact and ROI?

The challenges are not unique to oil and gas. In fact, you'd be hard-pressed to find a company in any industry that runs a perfectly tuned technology stack. Many companies purchase, deploy, and maintain an overwhelming array of software, including multiple, overlapping solutions to handle the same tasks. This can lead to a host of serious issues:

- Escalating / unsustainable spending
- Inefficiency and confusion
- Widespread underutilization
- Inconsistent processes and outdated workflows
- Disparate systems and siloed data
- Operational bottlenecks
- Poor performance and low ROI

Every company is unique, so specific technology needs will vary, but it is possible to leverage key industry insights, proven best practices, and practical tips to help you assess and optimize your tech stack with confidence.

This eBook outlines essential software for oil companies across the upstream, midstream, and downstream sectors. It also provides specific strategies to help you **define your technology needs, assess your tech stack, and improve ROI** by identifying and addressing common signs of underuse.

CONTENTS:

- **PART I: INDUSTRY TECHNOLOGY LANDSCAPE** *(Essential Software for Upstream, Midstream, and Downstream Operations)*
- **PART II: INDIVIDUAL TECHNOLOGY ASSESSMENT** *(Document, Evaluate, Strategize)*
- **NEXT STEPS: OPTIMIZE YOUR TECH STACK TO MAXIMIZE SOFTWARE ROI**

In considering your technology needs, it is helpful to start with a high-level view of essential software by industry sector, including typical usage, key benefits, and major solution providers.

ESSENTIAL SOFTWARE: **Upstream**

DRILLING DATA SOFTWARE

WHAT IT DOES

Logging While Drilling (LWD) and Measurement While Drilling (MWD) software platforms collect, process, display, and transmit real-time drilling data from downhole sensors. These platforms enable drilling teams to monitor critical formation properties (e.g., resistivity, gamma ray readings, density, wellbore trajectory) while drilling, enabling informed decisions in real time rather than waiting for post-well analysis. By integrating real-time data into geological models and automation systems, operators can optimize well placement, reduce drilling risks, and maximize reservoir contact via geosteering.

KEY CAPABILITIES:

Real-time remote monitoring and multi-well dashboards: Lets users visualize live drilling data securely from anywhere in near real-time, enabling simultaneous monitoring, comparison, and identification of subsurface anomalies.

Advanced data visualization and historical analysis: Provides configurable interfaces with trace graphs, alerts, and fine-grained adjustments, plus access to historical well data for analysis and optimization.

Geosteering and well placement optimization: Provides real-time LWD formation (resistivity, density, porosity) and MWD directional data for precise wellbore steering, maximizing reservoir contact and production potential with automatic well trajectory updates based on bit position.

KEY PROVIDERS:

- Pason and NOV

ESSENTIAL SOFTWARE: Upstream cont.

The upstream sector includes exploration, drilling, well completion, and production—all of which generate massive amounts of data. Effective software solutions are critical not only to manage this data deluge, but also to optimize operations and ensure regulatory compliance.

FIELD OPERATIONS AND PRODUCTION SOFTWARE

WHAT IT DOES

Field operations software is essential for monitoring production, tracking equipment performance, and meeting safety and environmental standards. Operators rely on these tools to keep operations stable and identify and address any changes.

KEY CAPABILITIES:

- **Real-time production monitoring:** Provides key metrics such as flow rates, pressures, and temperatures to help operators optimize output and stay ahead of potential issues.
- **Equipment maintenance scheduling:** Ensures preventive maintenance is performed, reducing costly downtime.
- **Environmental compliance tracking:** Automates reporting for emissions, spills, and other regulatory requirements.

KEY PROVIDERS:

- **Real-time monitoring and control:** CygNet, Ignition, and Wonderware
- **Production data management:** P2 Production

WELL PLANNING AND MONITORING SOFTWARE

WHAT IT DOES

Drilling operations are resource-intensive and require careful planning to optimize performance. Well planning and monitoring software helps operators do this by identifying efficient drilling paths, monitoring well integrity, and maintaining accurate reservoir models.

KEY CAPABILITIES:

- **Geological and seismic data integration:** Combines data sets for accurate drilling path designs.
- **Real-time drilling parameter monitoring:** Tracks key metrics such as torque, weight on bit, and mud flow to prevent failures.
- **Reservoir pressure forecasting:** Supports production optimization and intervention planning.

KEY PROVIDERS:

- **Well data management:** WellView
- **Reservoir modeling:** Petrel

ESSENTIAL SOFTWARE: Midstream

Midstream operations involve transporting, storing, and transferring oil, gas, and water. These processes require precise monitoring and control systems to ensure safe and efficient supply lines.

PIPELINE OPERATIONS SOFTWARE

WHAT IT DOES

Pipelines are the backbone of midstream operations, and software to monitor pipeline integrity, manage flow rates, and detect leaks is crucial for safety, efficiency, and compliance.

KEY CAPABILITIES:

Real-time monitoring: Captures metrics like pressures, flow rates, and temperatures to prevent failures and optimize operations.

Leak detection systems: Quickly identifies and addresses leaks to minimize environmental damage and operational disruptions.

Regulatory compliance tracking: Ensures adherence to Department of Transportation (DOT) and other regulatory standards.

KEY PROVIDERS:

- **Monitoring and control:** CygNet, Geo SCADA, Ignition, Wonderware, and AVEVA Enterprise SCADA
- **Electronic flow measurement:** FLOWCAL
- **Leak detection and regulatory compliance:** Atmos

STORAGE AND TRANSFER SOFTWARE

WHAT IT DOES

Midstream companies manage massive storage facilities and oversee the transfer of products between locations. Accurate inventory and custody systems (e.g., sales meters and LACTs) are essential for maintaining operational efficiency and accountability.

KEY CAPABILITIES:

Terminal automation systems: Streamlines loading, unloading, and blending processes.

Inventory management: Tracks stock levels in real-time, ensuring accurate accounting and reconciliation.

Custody transfer systems: Provides precise measurement during product transfers to ensure accountability.

KEY PROVIDERS:

- **Terminal automation:** OpenTAS
- **Storage and inventory management:** Tank Manager

ESSENTIAL SOFTWARE: Downstream

The downstream sector focuses on refining crude oil and distributing finished products. Precise process control and distribution logistics are critical to profitability and customer satisfaction.

CRITICAL REFINING SOFTWARE

WHAT IT DOES

Refineries are high-stakes operations that need to balance optimization, product quality, and compliance with environmental and safety regulations. Refining software provides tools needed to monitor and control these processes effectively.

KEY CAPABILITIES:

- **Process control and optimization:** Monitors and adjusts refining parameters to maximize yield and efficiency.
- **Quality management systems:** Ensures final products meet specifications required by end users.
- **Safety and environmental monitoring:** Tracks emissions and other safety metrics to meet regulatory requirements.

KEY PROVIDERS:

- **Distributed Control Systems (DCSs) to manage refinery operations:** DeltaV, Honeywell Experion, and PlantPAx
- **Laboratory management:** LabWare, SampleManager, and LIMS Software

DISTRIBUTION SOFTWARE

WHAT IT DOES

Once products are refined, they must be distributed. Distribution software supports logistical operations—including inventory management, customer orders, and delivery tracking—to ensure this process runs at peak efficiency.

KEY CAPABILITIES:

- **Order management and scheduling:** Tracks customer orders, scheduling, and delivery logistics.
- **Load rack automation:** Optimizes loading processes at distribution terminals.
- **Customer relationship management:** Manages customer interactions and ensures high service levels.

KEY PROVIDERS:

- **Order management and enterprise-level operations:** SAP S/4 HANA
- **Truck loading:** Toptech Systems

The oil and gas industry is highly specialized and regulated, but this doesn't necessarily mean you need a complex, costly software stack. In fact, it's common for companies to overpay for solutions that are underutilized, poorly integrated, or simply unnecessary.

By focusing on essential solutions tailored to your unique needs, you can create a streamlined and effective technology ecosystem—running the right software and using it to its fullest potential. Optimizing your tech stack can deliver significant benefits, including:

- **Improved operational efficiency:** Reduce redundancies and integrate systems to eliminate bottlenecks and reduce manual work.
- **Enhanced decision-making:** Consolidate data to gain a clearer picture of operations, enabling faster, data-driven decisions.
- **Regulatory compliance:** Automate compliance tracking to reduce the risk of errors and penalties.
- **Cost savings:** Eliminate redundant software to reduce licensing, maintenance, and training costs.

GETTING STARTED: REVIEW AND DOCUMENT

An important early step in evaluating your technology is simply conducting a comprehensive audit of your existing tools and how they fit into your business operations. If this sounds like a daunting task, it may help to break it down into five key stages:

1 **MAP CRITICAL PROCESSES**
Identify your essential business processes and document the software associated with each. Understanding which tools are truly essential, which add value, and which may be optional can be a quick way to uncover areas of overlap and inefficiency.

2 **FIND DATA HANDOFF POINTS**
Map how data flows between systems. This often reveals places where delays can occur or manual interventions are common. Look for opportunities to integrate or streamline to reduce friction and improve data flow.

3 **MEASURE INEFFICIENCIES**
Track how much time employees spend moving data between systems or manually compiling reports. This indicates gaps in integration and automation.

4 **EVALUATE UNDERUTILIZED SYSTEMS**
Identify tools that are used infrequently or in limited ways (less than 20% available features and capabilities). These may be ripe for replacement or consolidation—or possibly reintroduction or retraining for users. See "Testing for Weakness" below for more detail.

5 **ENGAGE STAKEHOLDERS**
Gather feedback from other key stakeholders including end users, IT teams, and operations managers. Team members with direct experience using, sourcing, or maintaining software can provide valuable insights about practical applications, key challenges, and system requirements.

DRILLING DOWN: FIVE KEY QUESTIONS TO ASK

Once you have a big-picture view of where and how technology is used in your company, the next step is to take a close look at the individual software packages you have in place. The goal with this exercise is to determine how much value a given solution contributes, as well as potential drawbacks or limitations. As a starting point, it may help to ask these questions about each solution:

1

DOES IT ADDRESS A SPECIFIC BUSINESS NEED OR PROBLEM?

Ensure the solution solves an important, known issue rather than adding unnecessary complexity or serving a purely aspirational purpose.

2

HOW SCALABLE IS IT?

In a dynamic industry, it's wise to invest in software with the versatility, flexibility, and scalability to adapt as your business and data needs change over time.

3

CAN IT INTEGRATE WITH EXISTING SYSTEMS?

Integration is key to avoiding data silos, ensuring smooth workflows, and helping reduce issues like high costs and low user adoption.

4

DOES IT MEET REGULATORY REQUIREMENTS?

Compliance is critical in oil and gas, so software needs to adhere to any applicable state and federal requirements (both current and anticipated) as well as industry best practices.

5

WHAT LEVEL OF SUPPORT AND TRAINING IS PROVIDED?

No solution is perfect, so having access to responsive, high-quality support over time is important. Look for a proven track record with implementation, accessible documentation, and a reputation for customer service.

PRESSURE TESTING: SPOT SIGNS OF UNDERUSE

Software underuse is a widespread and costly challenge in the oil and gas industry. A poorly utilized tech stack can affect everything from daily field operations to overall profitability and long-term strategic planning. The negative impacts are often obvious, but in some cases it may be harder to gauge just how much software underuse is hurting your company. To cite just a few examples, many companies incur "hidden" costs such as:

- **DIRECT WASTE:** Paying for capabilities, modules, and licenses that go unused.
- **MISSED OPPORTUNITIES:** Allowing teams to resort to manual processes and leaders to make decisions using stale, questionable information rather than real-time data and evidence-driven insights.
- **COMPETITIVE DISADVANTAGES:** Losing ground to competitors who have optimized their tech stack and implemented best practices to move faster, work smarter, lower overhead, and grow market share.

To help your company avoid these issues, look for these five telltale signs of software underuse (and apply these proven strategies to address them):

1 USING ONLY BASIC FEATURES OF EXPENSIVE SOFTWARE

Spreadsheets are powerful, but they can also indicate that your licensed software isn't being used to its full potential. If your team is still using Excel to track well performance, schedule maintenance, or manage compliance data, that's a red flag. Common risks of spreadsheet dependency include:

- Data inaccuracies from manual entry, shared input, and version control issues
- Compliance challenges during audits due to lack of standardized tracking
- Blind spots leading to decisions are based on outdated or siloed data
- Security vulnerabilities with files stored locally or shared via email

SOLUTION

Conduct a quick internal audit to determine which critical operations are managed in Excel, then cross-reference that list with your existing software stack. **Many platforms have modules designed to handle these tasks, but users may be unaware**. Where possible, start shifting processes into your licensed platforms to improve accuracy and efficiency, increase utilization, and boost ROI.

2 HOUSING DATA IN MULTIPLE SYSTEMS WITHOUT INTEGRATION

A typical oil and gas company might have SCADA systems, accounting software, compliance platforms, and geological tools. Each is powerful on its own, but when disconnected from each other their power and utility plummet. This fragmentation can lead to:

- Duplicate data entry across multiple systems
- Discrepancies (no single "source of truth") that cause confusion and slow decision-making
- Manual reporting that drains resources
- Incomplete visibility that blocks real-time insight

SOLUTION

Look for instances where the same data is being re-entered or reconciled across different systems. **Explore integrations that can streamline inputs and create unified data views**. In many cases, you may have APIs, native integrations, or data connectors built into your tools that haven't been activated. Going a step further, implementing real-time data ingestion can dramatically improve software utilization and reduce operational friction.

3 USING ONLY BASIC FEATURES OF EXPENSIVE SOFTWARE

It's common for companies to invest significant resources and endure months-long rollout projects to implement advanced software, only to have employees use it in the most rudimentary ways (if at all). For example, SCADA systems can be used to facilitate predictive analytics and automation, but end users may only access them to check dashboards. Other typical scenarios include:

- SCADA platforms with disabled alarms, underused analytics, or neglected optimization functions
- Production tools that offer forecasting, trending, and decline curve analysis—yet teams only enter daily numbers
- Asset management software with robust scheduling and lifecycle tools that never get implemented

SOLUTION

Access a copy of your software's capability matrix, then compare it to actual usage data for your company. **If your teams are using fewer than 50% of the features you are paying for, a reassessment is warranted** (potentially leading you to implement simpler solutions, additional training, or new processes).

4 STRUGGLING TO ACCESS KEY PERFORMANCE METRICS QUICKLY

In an environment where delays cost money (or impact safety), access to real-time data isn't a luxury—it's a necessity. If your executives wait days for KPI reports, or field teams can't check equipment status without making phone calls, your software isn't delivering. Other indicators of this issue include:

- Board reports are compiled manually each month
- Supervisors call for status updates instead of checking a dashboard
- Regulatory data take days to compile and validate

SOLUTION

Run a timed test to see how long it takes to answer key questions: What's today's production rate? Which wells are in alarm? Are there any overdue maintenance tasks? What's the field uptime percentage? How many open safety events exist? **If it takes more than a few minutes to get any of these answers, it's time to evaluate your SCADA system's reporting tools** and consider upgrading to a centralized system that can enable faster, data-driven decisions.

5 FAILING TO DEMONSTRATE CLEAR SOFTWARE ROI

Can you clearly connect your software investment to a measurable business outcome? If not, your tools are likely being underused, and teams may be locked in reactive mode, responding to issues as they happen, missing opportunities to adopt proactive strategies. In contrast, a modern system with optimal usage should equip you to:

- Conduct predictive maintenance based on sensor data
- Optimize production with real-time feedback loops
- Identify inefficiencies or potential failures before they escalate

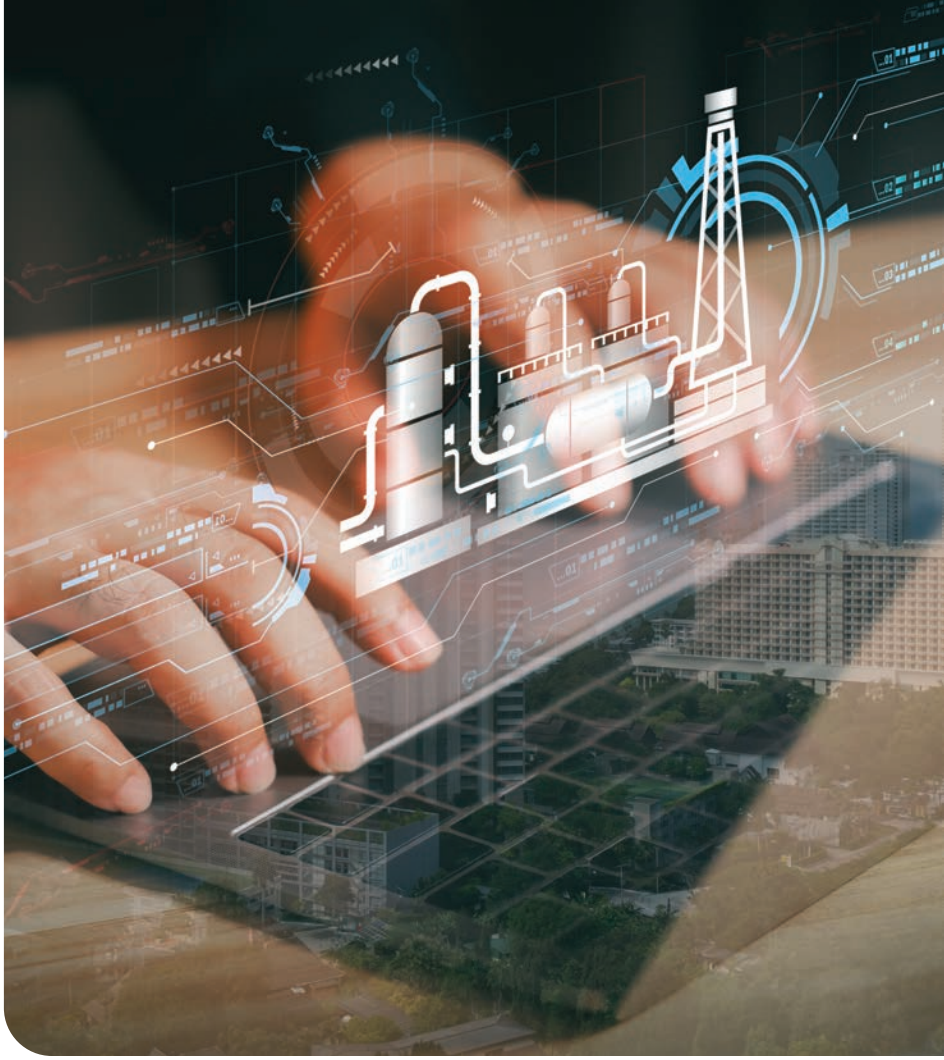
SOLUTION

Track KPIs such as maintenance percentages (emergency vs. planned), average time from event detection to resolution, and how often decisions are made using live data versus after-the-fact analysis. These metrics are telling signs of a company's technology maturity level and ROI.

CONCLUSION:

NEXT STEPS: Optimize Your Tech Stack to Maximize Software ROI

After reviewing essential industry technology and leading solutions, assessing your own software mix and utilization, and identifying key issues that may be impacting performance and value, you may be uncertain how to proceed. The good news is that addressing even serious issues with your tech stack doesn't have to be a daunting, disruptive, or expensive prospect. Keep in mind that more software isn't always better, and even different software may not be necessary.



A good place to start may be eliminating any redundant or unnecessary tools, and making better use of those with real potential. This basic action plan outlines key steps to take:

CONDUCT A SOFTWARE AUDIT

Map out your platforms and eliminate any with minimal usage or potential benefits. For those remaining, assess which features are in use, ignored, or misunderstood.

DELIVER TARGETED TRAINING

Move beyond general onboarding and access to documentation, and focus on providing role-specific training that unlocks high-value, underused features.

SET SOFTWARE UTILIZATION KPIS:

Track improvements by measuring desired improvements, such as time saved, features used, and reductions in manual work.

FOSTER CROSS-DEPARTMENT COLLABORATION

Encourage IT, operations, and finance to align around how to continue optimizing software use and value.

REVIEW AND OPTIMIZE QUARTERLY

Make continuous improvement part of your culture by reviewing usage trends and KPIs and updating goals regularly.

Looking for support with a technology audit, integration strategy, or solution migration or upgrade? Schedule a free consultation with the experts at CSE ICON today!

CONCLUSION:

The oil and gas industry is complex and high-stakes, but optimizing your technology doesn't have to be. With some key insights and strategies like the ones in this eBook, you can take steps to ensure you are running the right software, using it to its maximum potential, and driving measurable improvement across your operations.

ABOUT CSE ICON

CSE ICON provides innovative solutions and services to help companies digitize operations, optimize production, improve reliability and safety, and maximize ROI. A trusted partner to leading oil and gas companies for decades, CSE ICON is a platform-agnostic systems integrator with deep expertise in Real-Time Data and SCADA projects, including top-tier certifications and partnerships with OEMs including Canary, AVEVA (PI System, Wonderware), GeoSCADA, Ignition, CygNet, and more. Our deep bench of dedicated professionals can assist with solution design, installation, migration, upgrades, and support, so you can achieve your business goals and enjoy peace of mind knowing your critical technology is well looked after.

To learn more, visit: cse-icon.com

Email: contact@cse-icon.com | **Phone:** 281-670-1010

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