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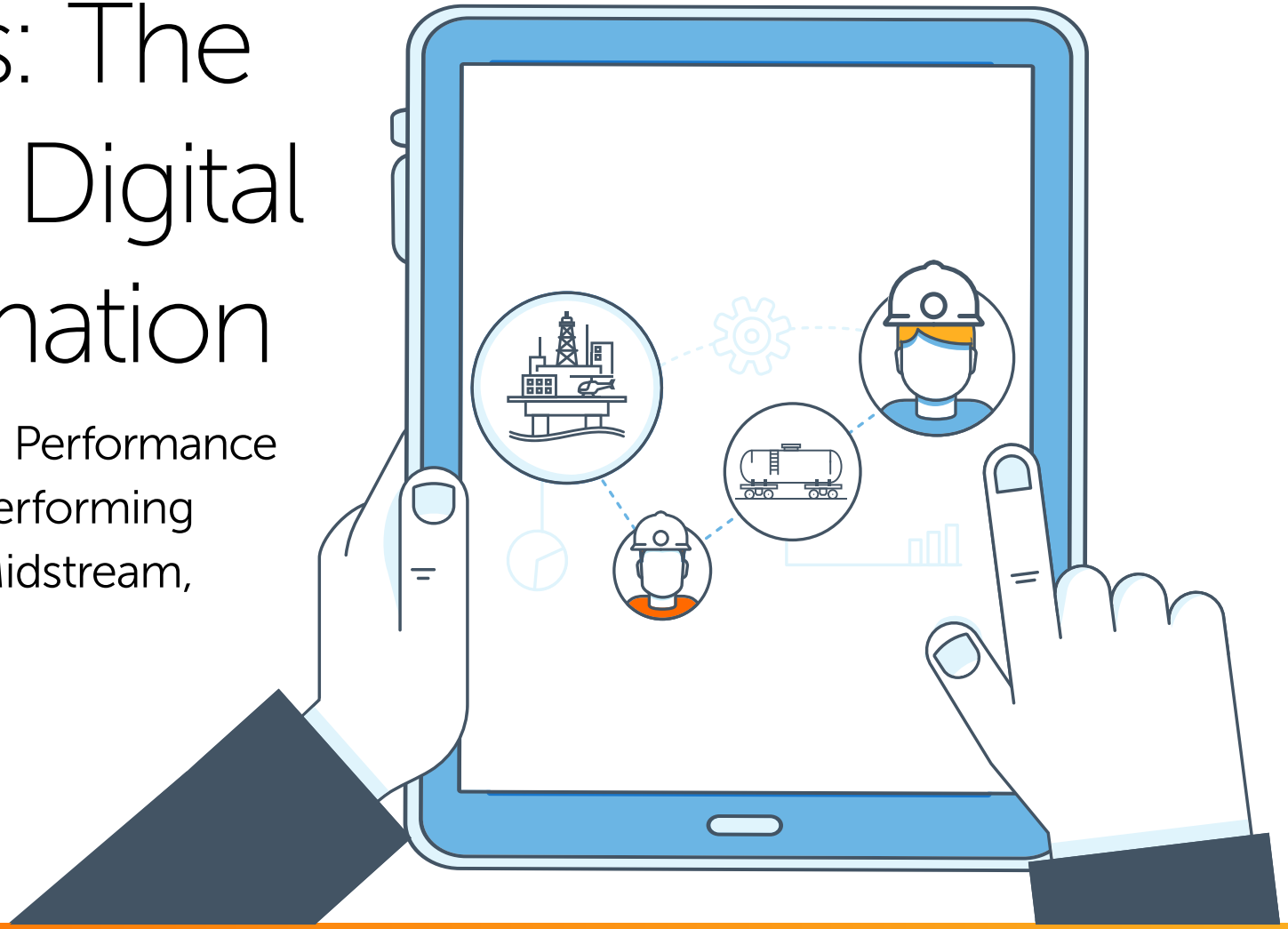
eBook

Oil & Gas: The Need for Digital Transformation

Network Visibility and Performance That Enables High-Performing Teams—Upstream, Midstream, and Downstream



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Digital Transformation Risks

The Oil and Gas industry is in the midst of a major transition. Since 2013 new technologies have reduced the cost of finding oil by 60% and lifting that oil by 40%.[1] These new technologies have transformed the industry into a true digital enterprise. All the major segments of the industry are undergoing this transformation.

Upstream, midstream and downstream businesses are involved in the effort of digitizing key processes, referred to as Operations Technologies (OT) to support these key business objectives:

- Standardize key processes to eliminate variability
- Optimize efforts to increase efficiency
- Automate to reduce costs and increase safety by removing workers from dangerous areas

The digital transformation comes with never-before-seen complexity of apps, networks, end points and places where business is being executed. Data centers and branch offices are no longer the center of the IT universe. Today's digital landscape has expanded to multi-cloud and hybrid networks. This has transformed the role of the CIO as well. The CIO position has become more central in operations planning and execution.

The industry is complex and usually is divided into three major segments:

Upstream or the exploration and production end that is involved with finding and lifting oil for further processing. The midstream segment is involved in the transportation of petroleum products to the next stage and finally the downstream segment that is dominated by refineries that transform the raw oil into usable products for industry and the consumer.

Executive Top of Mind Issues

Industry CIO and CTO interviews uncovered that the convergence of technological issues from the enterprise side and the process control side was top of mind. Historically, enterprise information technology (IT) concerns and OT activities of the process control departments could function fairly independently. Operations kept the upstream, midstream and downstream functions running smoothly, and IT managed business applications from the front office and control centers. However, the industry is changing. IT and OT have slowly been converging for years and this has precipitated other digital transformations:

Increase visibility into complex operations to control costs and optimize the performance of employees, facilities and assets

Oil and gas companies operate in some of the most physically and politically challenging environments on earth. The complexity is further intensified with volatile market prices, fluctuating demand, complex compliance and regulatory regimes, projects that involve multiple third party suppliers, and a workforce that has widely varying education and skill levels.

Improve collaboration with oilfield services to improve logistics

Even vertically integrated oil giants like Chevron and ExxonMobil must rely on third party suppliers to provide specialist equipment and expertise for different parts of the oil and gas supply chain.

Exploration & Production (E&P) companies and oil field services can work more effectively together by taking advantage of solutions such as cloud-based collaboration platforms through which they can share detailed planning and forecasting information and standardize processes for workers in the field.

Develop a high-performing culture through training, new systems and ongoing management

BP's Energy Outlook 2035 expects the global energy demand will rise by 41% from 2012 to 2035 with the vast majority (95%) of that coming from emerging economies.

The talent shortage isn't helped by the looming retirement of the industry's most experienced workers; the Society of Petroleum Engineers estimates that up to 50% of skilled workers could retire from the oil and gas industry within the next five to seven years.

Make the connection between improved asset management and execution excellence

Best practice facilities and their high performing teams have comprehensive, fully integrated systems and a culture directed at gaining greater lifetime effectiveness, value, safety, availability and profitability from production and manufacturing assets.

Use metrics as a "vital sign" of the effectiveness and the efficiency of your operational improvement efforts

The next generation of asset management tools, known as Advanced Condition Monitoring (ACM), provides a new set of predictive capabilities by monitoring real-time information on equipment and operations and applying analytics to detect a problem before it actually occurs.

Enable Knowledge Transfer to Maximize Operational Excellence

The Energy industry employs 1.5 million individuals. 70% of the energy workforce is 50 years old or older.[2] There is a significant amount of knowledge in these experienced and highly skilled employees who are retiring. This is often referred to as The Big Crew Change. Additionally, hiring talented individuals is a challenge if the industry doesn't offer exciting technologies that new employees can use to quickly expand their skills and have a long career path.

The industry must:

- Capture existing knowledge and know-how digitally through modeling, digital twins (virtual models that serves as the real-time digital counterparts of a physical components in the system) learning environments and remote access to experts who can't be onsite.
- Recruit 'digital natives' who can build a data base of reliable processes and embrace machine learning.

Riverbed's Application Acceleration helps ensure fast, agile and predictable delivery of applications from drilling sites—regardless of where applications are hosted or where end users reside. It accelerates app performance up to 10x by mitigating latency and reducing the network bandwidth congestion by 99%, improving productivity and satisfaction of remote workers.

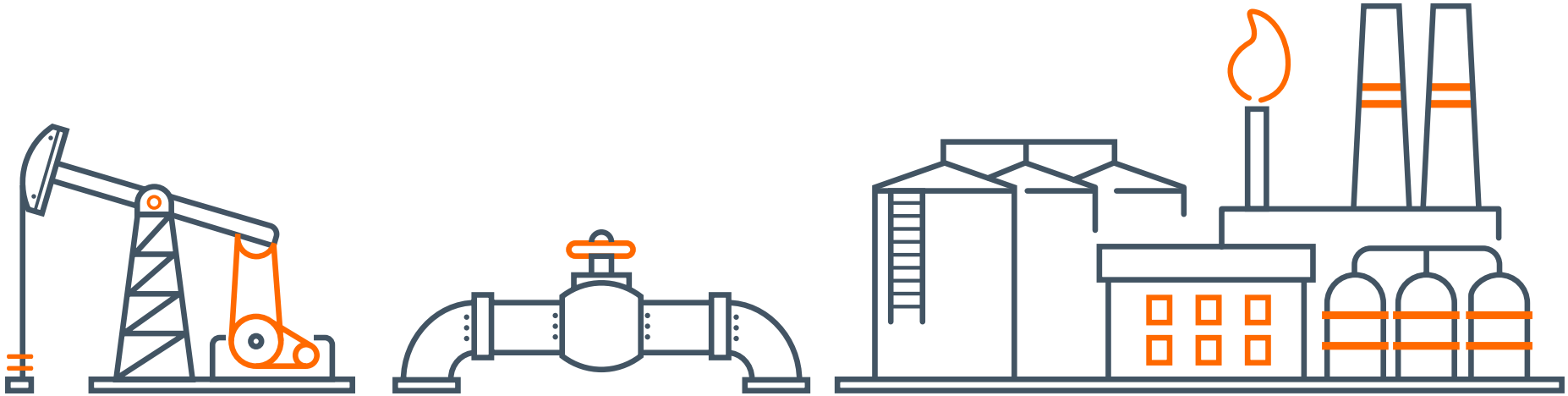
"Microsoft 365 is crucial for our day-to-day operations aboard rigs. Riverbed® SaaS Accelerator has been a great success in improving the cloud experience at sea. Downloading a large file is 80% faster with SaaS Accelerator"

Diogo Cunha, IT Specialist, PetroRio

The Upstream Challenge

About 40% of global crude oil and natural gas production comes from fields that have been in operation for more than 25 years—in fact, there are about 175 fields that have been producing for more than 100 years.[2] Considering that the continuity of production is key, the industry always finds itself in a never-ending cycle of upgrading and retrofitting. As a result, the industry has a large portfolio of producing assets that are less sensorized and digitally behind.

The use of seismic imaging—a process the industry has been using for over 80 years for evaluating and imaging complex subsurface formations—is requiring more intensive data analytics. These data intensive processes involve collaboration between many different engineering expertises and geological scientists. Networks that can facilitate these collaborative efforts in remote locations through data acceleration can have a positive impact on schedules.



High Performing Teams

Event Management Process: Data integration into real-time decision process

Avoiding problems during the drilling process is critical so data from the well head is constantly compared to the seismic model to verify the model's accuracy. This is a highly iterative process. The robustness of the network to connect the well head to the analysis team is essential to reduce time and cost. A closer look at the Event Management Process supported with the proper network tools can help in building high performing teams.

A typical Event Management Process in the upstream or downstream business is depicted in the figure below.

In many situations each step is accomplished very quickly or takes days depending on the complexity of the situation and the resources at risk.

The process can be simplified into the three major steps that follow:

- **Steps 1 - 4**: Problem Characterization or Data Collection Phase
- **Steps 5 - 7**:Learning or Analysis
- **Steps 8 - 10**: Decision Process

High Performing Teams

When the problem is characterized as the multi-step process in the accompanying figure (page 7), the quality of the data and analysis greatly affects the quality or affectivity of the decisions. Access to data and the ability to draw conclusions based on that data is dependent on getting the right information and having the right people analyze that information as soon as possible. So, the key is how fast you can get relevant data and understand it, and then make a decision that truly has the buy-in and cooperation of the whole team.

Riverbed® enables robust network performance offering accelerated SaaS performance up to 33x by mitigating latency and reducing bandwidth up to 99%. Connecting anyone anywhere lets you leverage in-house talent for effective analysis and decision making while creating High Performing Teams.

It is a well-known fact that if there is little buy-in to a decision, implementation has a greatly reduced probability of success. The learning that occurs during the analysis phase fosters high performing teams to bridge the gap between decision(s) and implementation.

The Highly Integrated Supply Chain

The Energy industry is a complex assemblage of different suppliers all with their own expertise. The integration of these complex supply lines is dependent on robust secure networks.

- Riverbed Application Acceleration is a unique offering. No other vendor offers comprehensive Client and SaaS acceleration
- A unique end-to-end offering geared to address today's digital enterprise, SaaS applications are accelerated from cloud to laptop and/or field user end points, with comprehensive end user experience visibility on a global scale

RigNet Case Study

Offshore drillers need more network capacity for critical applications—on the ocean and on land. The solution: a managed Riverbed SD-WAN service from RigNet.

Challenges

- High costs of downtime—up to $1 million a day in rig rental costs
- Unreliable connectivity at sea due to restricted bandwidth and high winds
- Space constraints on rigs
- Complex regulations defining the countries in which satellite data can land
- Need for visibility across multinational operation

Solution

- Managed SD-WAN service using Riverbed® SteelConnect™, with global satellite, LTE, and microwave links
- Riverbed® SteelHead™ WAN optimization aboard rigs—for integrated SD-WAN and WAN optimization
- Riverbed SaaS Accelerator, for fast cloud services like SAP and Microsoft 365

Benefits

- Reliable connectivity: traffic is sent over the best transport at the moment
- 90% less network infrastructure, lowering space, power, and cooling requirements
- Faster site onboarding, with zero-touch provisioning
- Visibility into application performance from a single portal
- Improved crewmember quality of life, a morale booster and retention advantage

Midstream and Downstream Operations Has Become Network Intensive

North America is amidst a midstream energy infrastructure building boom, which appears poised to last for at least the next 18 years. The Interstate Natural Gas Association of America Foundation estimates that midstream companies will need to invest nearly $800 billion through 2035, or $44 billion per year.

Digital transformation initiatives are opening up new possibilities and changing traditional business processes.

These key processes will benefit greatly from these new digital capabilities.

Management of feedstocks and the price arbitrage is a critical capability that drives profitability.

Understanding the value of a digital, data driven approach can reduce downtime costs by 70%.[3]

In transportation, digitization has streamlined the movement of crude and products to and from refineries by determining the timing and optimizing the mode of transport (from pipeline to truck, rail, or ship).

Digitizing operations has boosted refinery yields and throughputs. Using new software in scheduling and within the supply chain has enhanced maintenance execution, boosting labor productivity and reducing cost.

"It is extremely important for midstream companies to embrace digital transformation, rethinking outdated business models and strategically applying technology to change them, rather than focusing only on cost cutting."

Emerson

Cybersecurity

Managing aging infrastructure that is geographically dispersed presents unique challenges for the midstream and downstream businesses. Obsolete technologies and automation makes this infrastructure vulnerable to cyberattacks. The industry has multi-dimensional cybersecurity challenges:

Complex Ecosystem

Joint operations take place across regions and employ multiple vendors with different security guidelines.

Fragmented Ownership

IT and OT (Operations Technologies) were developed with distinct missions and as a result, ownership of cyber security is fragmented across the organization.

Latency Concerns

Firewalls could introduce unacceptable latency into time critical industrial control systems (ICS) that face operational constraints.

Multiple Cyber Standards

A mix of proprietary and off-the-shelf technologies complicates the problem.

Irregular Patching

Security patching of many systems is inconsistent and vendor specific. Often these systems are in remote unmanned areas.

Legacy Concerns

Many systems have long life cycles (10yrs) and were not built for cybersecurity. Updating them is costly and negatively impacts operations.

Cybersecurity

The right visibility solution can ensure network resiliency and security whether your users are in the office, at the well head, or on the refinery grounds.

There are four core requirements:

1. Comprehensive visibility

Providing always-on, full-fidelity capture of every packet, flow and device metric across on-premises, cloud, multi-cloud, and virtual environments supports the needs of O&G teams.

2. Security forensics

Use your always-on, full-fidelity data to hunt down advanced persistent threats. Threat hunters can rapidly search, pivot, and filter down to traffic of interest to quickly answer the difficult questions—even about incidents that happened months ago. It can also conduct structured, documented forensics analysis.

3. Artificial intelligence (AI) and machine learning

Collate and apply analytics to derive meaningful and actionable insights. Understanding what constitutes normal traffic patterns, detecting anomalies, accurately identifying correlations versus causations, and being able to quickly respond and mitigate performance problems and cybersecurity threats—all of this depends on your ability to see and analyze what is happening across your distributed network—on-premises, virtual, or in the cloud.

4. Deep integration

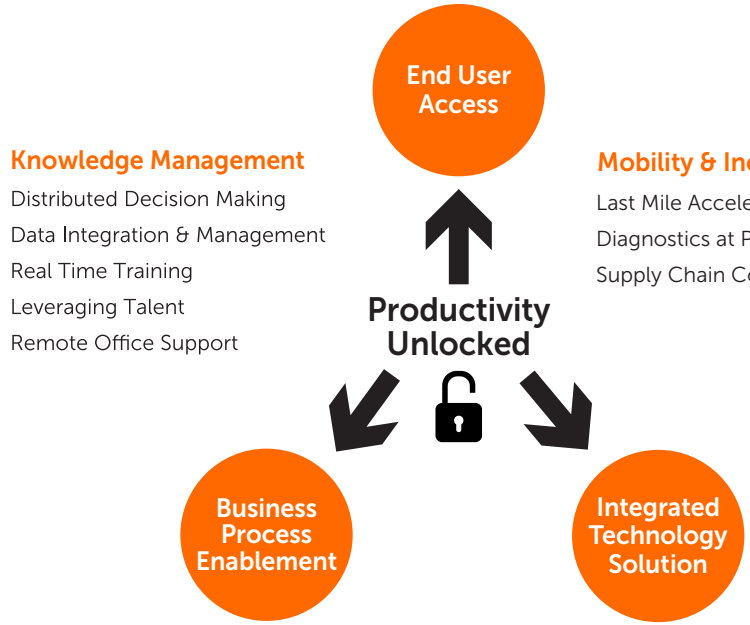
In a highly complex, distributed environment, modern solutions must tightly integrate with complementary solutions. Open APIs so you write your own applications that communicate with systems and services as well as built-in integrations to "popular" services, like Splunk and ServiceNow, are essential.

Network Acceleration Enables Integrated Operations

Business in the next century will be dominated by the fastest innovators. Innovation—the culture that supports it, and the tools that facilitate it—will be one of the key executive initiatives and the focus of winning strategies going forward. Hiring the right people will not be enough; getting them to think about the right things in the right context will be paramount.

Robust reliable and secure networks have become the primary knowledge management mechanism. Information density is constantly requiring advanced analytics to extract trends and relationships. The digital transformation and the networks that enable the transformation put information at point of need. Riverbed Digital Networking seamlessly integrates SD-WAN, cloud networking, security, application acceleration and visibility into the most intuitive and highly automated solution on the market today.

Holistic Approach to Network Support for Key Business Process



[1] His Connect, Strategy & Analysis
[2] Rystad Energy, UCube Database
[3] https://www2.deloitte.com/us/en/insights/industry/oil-and-gas/digital-transformation-upstream-oil-and-gas.html

About Riverbed

Riverbed enables organizations to maximize performance and visibility for networks and applications, so they can overcome complexity and fully capitalize on their digital and cloud investments. The Riverbed Network and Application Performance Platform enables organizations to visualize, optimize, remediate and accelerate the performance of any network for any application, and helps to identify and mitigate cybersecurity threats. The platform addresses performance and visibility holistically with best-in-class WAN optimization, unified network performance management (NPM), application acceleration (including Microsoft 365, SaaS, client and cloud acceleration), and enterprise-grade SD-WAN. Riverbed's 30,000+ customers include 99% of the *Fortune* 100. Learn more at at riverbed.com/solutions/oil-gas.