OIL & GAS OPERATIONAL EFFICIENCY
Making Better Decisions Faster while Reducing Cost

EXECUTIVE BRIEFING
Data Management Optimization
Petrotechnical & ERP Systems Infrastructure Management
Agile Analytics and IoT for Efficient Operations
Business Continuity
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INTRODUCTION – SOLUTIONS FOR CHALLENGING ECONOMICS

Today’s environment of low oil prices is having a negative impact on expansion plays and profit margins. As a result, there is a trend of downward pressure on oil & gas revenues, and a need to reduce costs.

Dell EMC believes that in the current economics of the industry, a strategy based on operational efficiency where we bring IT Innovation and the Business together introduces a level of robustness that is more sustainable than purely cutting costs.

According to the Gartner report ‘Hype Cycle for Upstream Oil and Gas Technologies, 2016’, upstream Oil & Gas CIOs are trying to balance 3 priorities with potentially limited IT resources:

1. **IT OPTIMIZATION**: This objective focuses on creating a lean and agile IT function that delivers fit-for-purpose IT services and projects. IT optimization includes cost reductions, but goes beyond and incorporates technologies such as data lakes, postmodern ERP, sourcing optimization and operational technology security.

2. **BUSINESS OPTIMIZATION**: This objective focuses on improving business performance by creatively adopting digital technologies in ways that move important business metrics in the correct direction. Progress is linked to technologies such as data-intensive oil field services, autonomous field vehicles, integrated upstream modelling and cloud-based high-performance computing. These technology profiles make up the largest portion of this Hype Cycle, consistent with overall industry priorities.

3. **DIGITAL TRANSFORMATION**: This objective focuses on adopting the relevant practices of born-digital companies into the asset-intensive model of oil and gas. Traditional business platforms used by oil and gas companies are costly, closed and rigid and are barriers to achieving the productivity, agility and innovativeness observed in other industries. Key technologies for transformation include machine learning, integrated planning and operations, enterprise information management programs, and non-physical modelling.

With over 25 years in the industry, Dell EMC is well positioned to enable Oil & Gas companies to address these priorities to deliver significant incremental value. Our technology solutions help businesses increase revenue by Making Better Decisions Faster and Reducing Cost through Efficient Operations – both of which have positive influences on the Hydrocarbon Value Chain. Our transformation strategy blends Data and Operations Optimization with Agile Analytics and Business Continuity.
DELL EMC FOR OPERATIONAL EFFICIENCY

Providing clear business benefits with bottom line results is the key driver behind Dell EMC’s focus and strategy, including faster time to oil, increased productivity of the geoscience community, and improved collaboration amongst stakeholders across the Hydrocarbon Value Chain. We work directly with Oil & Gas companies to deliver improved performance in the following areas:

- **SEISMIC DATA**: Associated interpretations such as Attribute Analysis, Inversion, Pre-Stack and Post Stack are growing in scale and complexity. Multi component data will add to the volume and complexity, requiring ever more flexible data handling and management solutions.

- **REAL TIME DATA ANALYTICS**: Dynamic reservoir management and overall production operations will benefit from real time data analysis, modeling, scenario planning and debottlenecking throughout the life-cycle.

- **LIFE OF FIELD**: Reservoir management and extension of the life of field requires continuous updating of data and models as new seismic, drilling, completion and production technologies evolve, creating ever more data and reference points from which to make key development, exploitation and production enhancement decisions.

- **PRODUCTION OPTIMIZATION**: Effective and efficient data capture and integration from real-time systems, operational databases and solutions, and engineering application derived models will enable Real-time Production Operations optimization capabilities delivering measurable improvements and clear bottom-line results.

- **COLLABORATION**: Sharing of information and models between partners, peers, clients and investors can be made significantly simpler across real world limitations of data sharing and global communications infrastructure.

- **DATA ACCESS**: Capture, storage and availability to all levels and types of data and resultant information should be automated, non-complex and rapid. The geoscientists and engineers need to focus on their core activities.

Dell EMC solutions for Oil & Gas drive transformation in 4 broad categories, with each bringing incremental value to the other, delivering huge overall gains in Operational Efficiency – Data Management Optimization, Petrotechnical & ERP Systems Infrastructure Operations Optimization, Agile Analytics for Efficient Exploration & Production Operations and Business Continuity in terms of systemsuptime and recovery, as well as Security.

Dell EMC has developed a dedicated global Oil & Gas Practice, supported by significant committed investment in a global industry program that is tailored to meet the specific innovation requirements of Exploration & Production business functions.
DATA MANAGEMENT OPTIMIZATION ACROSS THE HYDROCARBON VALUE CHAIN

Dell EMC provides solutions that aggregate and consolidate data storage resources with technology that is easy to manage and scale at a very low total cost of ownership (TCO).

The benefits of our data storage management approach are also manifested in clear end-user productivity.

The Dell EMC Scale-Out Geoscience™ solution is a uniquely agile platform that accelerates the delivery of quality-checked data to geoscientists by combining the quality checking and data management workflow software from Meera Technologies with the Dell EMC Isilon scale-out storage platform.

It utilizes an approach that is automated with full auditability, creating the critical missing link between the seismic master data sources and project environments driven by interpretation and modeling tools from Schlumberger, Halliburton Landmark, IHS and others.

The solution dramatically reduces the petrotechnical IT burden of taking seismic data from the field and preparing it for consumption by geoscientists.

The Dell EMC Active Geoscience Archive solution combines cost effectiveness with a hyper-scale storage platform.

The value proposition of this petrotechnical archive solution delivers:

- **ORCHESTRATION**: On-demand scalable data storage provisioning, enabling more data to be brought online more securely as an active archive
- **AVAILABILITY**: Faster time to value as a result of significantly improved data cataloguing, access and retrieval methods, particularly as archived data will be stored on disk as opposed to tape
- **COST EFFICIENCY**: A dramatic reduction in data management costs, as any previous CAPEX responsibilities associated with on-premise disk archiving is replaced by a more cost effective on-premise hyper-scale object store, or consumption-based OPEX budgeting via a cloud service provider.

For example a large Oil & Gas Independent saw a 68% reduction in petrotechnical IT administration, a 40% reduction in big data storage costs and an overall ROI of 80% when they addressed their petrotechnical data management needs with Dell EMC technology.

In a recent scenario, EMC was able to transform an 80 hour multi-terabyte seismic loading, indexing and visualization project into a 7.2 hour exercise – over 10 times faster than the typically accepted architecture configuration at the time.
PETROTECHNICAL & ERP SYSTEMS INFRASTRUCTURE OPTIMIZATION

With Dell EMC, you can optimize the IT infrastructure that protects and connects the data to applications using technology that supports a variety of workload types. This enables the rapid deployment of critical applications such as G&G and ERP systems—shrinking what used to take months down to being live in days.

For example, our converged infrastructure G&G (Geology & Geophysics) application platform—the Dell EMC Petrotechnical Appliance—is typically 5 times faster to deploy than the traditional component-based approach.

The appliance enables G&G application users to quickly get on with performing interpretation and modelling, with the appropriate performance configuration right out of the box—and crucially with 96% less downtime per year.

We also make it easy for you create a cloud-independent environment in which to move application workloads back and forth across the full spectrum of cloud environments—private, public and hybrid—which means that you can leverage the correct economic IT model that suits the characteristics of individual workload needs. Why is this important?

For many years, companies have tried and largely failed with huge Digital Oil Field projects that are meant to unify operations across the board. Apart from crippling costs and technology limitations at the time, the projects were unsuccessful mainly because solutions often advocated a rip-and-replace approach of shutting down older systems and spinning up whole new so-called advanced digital systems. We have also seen many mobility projects aimed at improving field collaboration underperform, not because increasing the ease and speed of information-sharing is somehow unwarranted, but because introducing mobility brings only a tiny increment of value if the rate of collecting and processing information remains poor in the first place.

In order to get to an effective sustainable solution, we need to accept 2 things:

1. The reality for most Oil & Gas companies is that probably for at least the next 10 years, there will be a big portfolio of the existing traditional applications to manage—the so-called Platform 2 largely client/server applications

2. Increasingly, people will want to see their data online in order to analyze it with a more agile approach so that timely actionable insight can be derived—using the Platform 3 elements of Cloud, Mobility and Big Data

Rip-and-replace won’t work. What we need is a way to:

- Make Traditional (Platform 2) applications work in a more cost effective way
- Bring in the new Cloud Native (Platform 3) applications, while also addressing the challenges of collaboration and mobility across the hydrocarbon value chain
Dell EMC’s experience is that the sharing of information will remain a challenge if each IT group seeks to implement separate data management strategies. Traditional Platform 2 applications tend to require high bandwidth access to bring data to individual users’ high-performance expensive workstations, whereas Platform 3 systems deliver benefit by placing application code and analytics closer to the data, offering users greater geo-location freedom to share centrally aggregated resources.

We require a Bi-Modal Petrotechnical IT approach, an incrementally implemented single environment or framework where both Traditional and Cloud Native application workloads can interact and flourish.

The Dell EMC Bi-Modal Petrotechnical IT approach delivers the most optimized solution where both Traditional and Cloud Native systems share 100% of the same data, and where possible, leverage the same IT resources, or at least the same philosophy for deploying resources.

Dell EMC provides 3 interconnecting components that are vital to successfully implementing Bi-Modal Petrotechnical IT:

- Dell EMC Upstream Data Lake for enabling effective data sharing
- Dell EMC Converged Infrastructure for simplifying and accelerating the deployment and management of IT resources
- Dell EMC Enterprise Hybrid Cloud (EHC) to leverage the full spectrum of computing economic models – from on-premise or off-premise Private Cloud to Public Cloud resources

Dell EMC is well placed to make Bi-Modal Petrotechnical IT a reality, and is already helping many Oil & Gas companies to reap practical benefits along this journey to greater operational efficiency.
AGILE ANALYTICS FOR EFFICIENT UPSTREAM OPERATIONS

Dell EMC enables the execution of agile analytics to provide timely insight to help improve efficiencies in areas such as drilling operations, and to dramatically reduce non-productive time (NPT) through advanced predictive maintenance, field logistics optimization and overall asset operation efficiency. We enable you to move towards a single version of the truth by building an Upstream Data Lake from which insight can be derived to optimize operational and strategic planning – to make better decisions faster.

For example, an Upstream Data Lake boosts your ability to create a comprehensive view of a reservoir in order to better understand its recovery potential, enabling:

- **The Building of Predictive and Prescriptive Models that:**
  - Improve production and reserves forecasting to drive better Inventory Update Reporting (IUR)
  - Optimize completions and engineering designs for more efficient production operations

- **The Deployment of Predictive Analytics to:**
  - Optimize drilling/treatment for production ‘sweet spots’ — including best placement, steering and timing
  - Enrich drilling and completion models with operational factors to reduce non-productive time (NPT) and to increase efficiencies across reservoir and asset lifecycles

Dell EMC Upstream Data Lake solution enables companies to leverage scale-out storage to bring together use case-relevant data from an unlimited range of sources. Companies will be able to load their full upstream lifecycle data to a single environment and make that data available to existing Traditional (2nd Platform Client/Server) and Cloud Native (3rd Platform) applications, as well as analytics workloads.

The potential benefits of Agile Analytics for both conventional and unconventional fields are staggering. In a recent case spanning 10,000 wells, analytics using Dell EMC solutions has shown an increase in oil production projections of 8-14% and decreases in completion costs of more than 5%.

It brings together all of the technical components need to not only store and provision heterogeneous data cost effectively, but to enable advanced analytics to be performed on the data In Place, leading to faster time-to-insight and therefore increased business agility.
Specialized workloads such as Seismic RTM (Reverse Time Migration), Seismic Pre-Stack Time Migration, Seismic Depth Migration and Reservoir Simulation as best executed in an HPC (High Performance Computing) cluster environment in order to process large volumes of data to deliver quick actionable results.

Dell EMC provides a range of HPC servers that support a comprehensive range of networking types, and also provides HPC-relevant storage solutions such as rack-scale flash.

The Upstream Data Lake and HPC computing are really parts of a bigger operational efficiency system – the Digital Oil Field. The concept of a Digital Oil Field is nothing new, yet the Oil & Gas industry still struggles to leverage broad-scale big data & analytics in a way that makes it as mainstream and clearly understood as interpretation and modelling processes. Granted there has been some success in areas such as predictive maintenance and drilling optimization, but very little in sustained step-change improvements that have redefined the way production is planned and executed, especially when we look back at 2015 Oil & Gas economics and the continued challenge in 2016 and beyond.

One of the key obstacles that make leveraging the power of analytics difficult is the sheer volume and variety of data available to potentially fuel workflows:

- How do I consolidate data from multiple systems into a single secure environment (a Data Lake) that scales easily and cost-effectively so it can be more easily managed?
- How can I create models across heterogeneous data sets so that benefits can be seen not only in one section of the Hydrocarbon Value Chain, but across multiple domains to produce exponential benefits?
- How can I execute analytical workloads at a velocity that is sympathetic to data latency issues so that business planning fundamentals have a larger reliable predictive component?
The Dell EMC Upstream Data Lake mentioned previously offers the data consolidation and provisioning environment to support the Digital Oil Field, but there are even things we can do ‘at the edge’ where field assets are actually generating the data we eventually want to analyze. This is where the world of the Internet of Things (IoT) begins.

At Dell EMC, we have developed and continue to develop solutions that enable Oil & Gas companies to leverage current infrastructure investments while adding IoT at the edge. Dell Edge Gateways do more than simply route data back to a centralized location. They can store data and act on it using processes defined by workflow software to make automated decisions in the field to recalibrate equipment or to aggregate data before sending it on to the Upstream Data Lake. The schematic below shows how we can incorporate IoT into the Digital Oil Field picture:

We are turning the promise of the IoT into reality for our customers starting with three key best practices aligned to current state field operations environments:

1. **Build on Automation** – most Oil and Gas companies have some level of Automation in place in their fields. Some are more sophisticated than others, while all are probably not taking the Best and Most Advantage of the data being constantly generated in the field for improved utilization.

2. **Capture and Use ALL Data** – We must ensure a fully integrated, highly reliable solution is enabled that will properly capture all the filed based IoT data, but is also capable to capture, ingest, process and analyze ALL data from sophisticated machine assets from local to in remote oil field sites and INCLUDES the regional / centralized data and engineering model.
   - All O&G companies have a lot of data both real and relevant time a tone of models both engineering and data driven and a ton of applications that utilize this data in one form or another.
   - What they need help with is in fully leveraging and creating business value out of ALL the data to improve operational efficiencies and bottom line results.

3. **Enable Edge to Core Analytics** – capturing data at the edge and creating in-line data validation and conditioning, intelligent alerting and integrated data mining activities is clearly needed to improve efficiencies. Further capture and integration of ALL data within an integrated Data Lake for advanced data mining and analytics will enable us to deliver optimal performance models for the edge workloads within a Continuous Improvement life-cycle model.
ENTERPRISE SECURITY AND DATA PROTECTION

Organizations around the world are dealing with a dramatic increase in the volume of digital information, and Oil & Gas companies are no exception. The critical infrastructure, related data assets and applications that support the hydrocarbon value chain could be susceptible to Cyber Attacks.

These attacks may not only impact the Oil & Gas companies themselves, but also the delivery of the commodity and the stability of wider market economics, geopolitical relationships and even the natural environment. They are offensive acts employed by both individuals and whole organizations to target computer information systems, infrastructure, communications networks, and personal computer devices, usually originating from an anonymous source. The intent of the attack is to steal financial and operational data, Personally Identifiable Information (PII), Intellectual Property (IP), or to disrupt the physical processes managed by industrial control systems.

RSA, the Security Division of Dell EMC, is the premier provider of intelligence-driven security solutions. RSA helps the world’s leading organizations solve their most complex and sensitive security challenges: managing organizational risk, safeguarding mobile access and collaboration, preventing online fraud, and defending against advanced threats. RSA delivers agile controls for identity assurance, fraud detection, and data protection, as well as robust Security Analytics and industry-leading GRC capabilities.

- **A Big Data Approach to Security Management:** RSA’s distributed data architecture enables customers to collect and analyze security data at an unprecedented scale and rate of change.

- **A Unified Approach to Security Analytics:** RSA provides a common set of services and tools for analyzing security data to support the major analytic activities, from alerting and reporting to malware analytics.

- **A Governance Layer that binds Security Analytics to the business:** RSA’s unique portfolio streamlines the process of gathering information about critical business processes and systems, together with the business context and requirements for securing them.

- **Threat Intelligence that empowers customers with up-to-date knowledge:** Through RSA technology and services, the security solution makes actionable intelligence about the threat environment available for analysis in real-time, enabling organizations to relate the intelligence specifically to their environments.
It is important to protect specific systems integral to operations being executed in:

- Exploration and Production Platforms
- Pipeline Infrastructure
- Tank Farms
- Refineries
- Power Supply and Telecommunications infrastructure

With detailed insight into all activity in SCADA (Supervisory Control and Data Acquisition) systems and enterprise networks, asset owners and operators are equipped to detect complex IT risks that are invisible to other technologies and are empowered to take precise action against cyber threats.

Against fundamentally different attacks in a hyper connected world, we need a fundamentally different response. Whilst it is prudent to continue to focus on keeping attacks out at the perimeter, by far the most effective investment should be on accelerating the ability to detect and respond to intrusions – especially with the complex business operating model needed to support the hydrocarbon value chain.

Advanced threats require enterprise-wide visibility into network traffic and log event data, but this data alone does not provide enough information to enable effective detection and investigation of these types of threats. The RSA Security Analytics Solution addresses this challenge effectively.
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