A brave new world: Chemicals and petroleum in the 21st century

Enhancing operational flexibility with cost-effective cloud computing
Executive summary

Even for an industry that manages difficult environments well, the pace of change in the global energy market is creating some substantive challenges for chemicals and petroleum companies. These organizations seek ways to act quickly and with confidence in a business landscape that continues to grow more complex by the day. Price and supply volatility, environmental concerns, global regulatory obligations and new technologies for extraction and resource discovery all combine to make the chemical and petroleum industry difficult to navigate. The industry requires innovative business models—with shared data, processes and workflow—to improve production efficiency and sustain growth. IBM believes that cloud computing technologies are particularly well-suited for chemicals and petroleum organizations that seek to build a proactive approach to meeting the challenges of this dynamic new age.

This paper provides a view into how cloud computing can support the chemicals and petroleum industry and describes the technologies and functions that can help them improve efficiency, reduce costs and enable new capabilities. Guidance is provided to help you determine which applications, services and technologies should be considered for development and deployment “in the cloud” to meet the goals of your extended enterprise.

The chemicals and petroleum industry is facing a period of dramatic change. The Energy Information Administration projects total world consumption of energy to grow by 56 percent by 2040.1 Hit-or-miss exploration methods, inefficient refining and manufacturing practices and disconnected supply chains can—and do—impact the price and availability of chemical and petroleum products. Furthermore, against the backdrop of supply and demand pressures, the focus on environmental responsibility and employee safety continues to grow.

The efficient operation of plants, refineries and offshore assets requires effective data management and monitoring of real-time information and complex events. Automation is required for certain business processes and very complex production calculations. The ability to communicate and visualize information is essential—not only at a particular site, but aggregated over multiple sites and delivered to either individuals or groups that need to collaborate.

Globally, the challenge is to reduce downtime, improve operational effectiveness and increase recovery of resources—whether in production assets, refineries or chemical plants. Being a successful player in the chemicals and petroleum environment depends more than ever on understanding your own circumstances (assets, finances, markets, skills, commitments, and so on) and being able to evaluate accurately information offered by others.

To meet these challenges, chemical and petroleum companies must innovate in four essential areas:

- Improving production operations
- Managing costs effectively
- Improving workforce collaboration
- Managing information technology

Meeting the challenge: Improving production operations

A smarter approach to managing operations can help chemicals and petroleum companies address these complex challenges. By integrating data from instrumented operations with information from external and backoffice sources, companies can gain real-time visibility into all of their systems. This increased visibility can be used to help find and exploit previously inaccessible oil and gas reserves, improve asset use, improve manufacturing and refining efficiency and reduce costs and risks.
Meeting the challenge: Managing costs effectively
Chemicals and petroleum companies are among the most asset-intensive in the world, so getting the most from every asset is essential for success. However, multiple corporate acquisitions, and a piecemeal approach to business solutions has created disconnected operations, disparate types of assets and isolated systems, which can lead to serious inefficiencies that affect production and increase costs. A smarter approach to asset acquisition and use, along with optimized operations and data storage, can help companies reign in spiraling costs.

Meeting the challenge: Improving workforce collaboration
As the complexity and scope of corporate operations grows, the transmission of information creates new challenges. It becomes extremely difficult to make the most accurate and informed business decisions when confronted with a multiplicity of systems, a labyrinth of non-standard procedures and an inability to interact collaboratively on important issues such as computation, evaluation and analysis. New forms of collaboration, such as social networking, can help chemical and petroleum companies improve workforce cooperation without adding additional systems and applications.

Meeting the challenge: Managing information technology
Reduced complexity and sustainable integrated operations can be accomplished using information technology (IT). However, the management of IT investments represents a challenge in its own right, particularly in regard to managing ongoing operational costs. These areas have been a target for cost reduction and efficiency improvement for some time. IBM strongly believes that using cloud computing to deploy IT will be a key to success in the future. In particular, it can help the chemicals and petroleum industry address the real challenges it faces today, with the flexibility to support the trends that will shape its future.

Cloud computing: A smarter way to work
Across the globe, new technologies are transforming how companies manufacture, market, distribute and sell their products. And the chemical and petroleum industry is no different. The business processes involved in the exploration, development and production of oil fields along with the manufacturing and selling of the products are increasingly being digitized, resulting in increased speed, capacity and intelligence. More and more, chemicals and petroleum companies must rethink how they operate and take a fresh look at how they deploy their IT resources.

In the last several years, cloud computing has emerged as the go-to technology for providing a highly automated, dynamic alternative for the acquisition and delivery of IT services. Companies are making the most of the massive scalability and collaboration capabilities it provides and are deploying new services with greater speed and with little to no capital investment. And as IT budgets continue to shrink, cloud computing can enable business leaders to do more with less. Virtualization, standardization and other fundamental features of cloud computing have the potential to lower the cost of IT, simplifying service management and accelerating service delivery.

A cloud computing architecture enables flexibility, using a highly virtualized, automated and service-oriented design. Companies gain rapid, on-demand access to vast computing power, storage and applications. In the process, they are able to develop and deploy new applications quickly. Users can request hardware, software and applications from an online catalog. Self-managing, autonomic systems make it possible for capacity, provisioning and other IT service management decisions to be made dynamically, without human intervention or increased administrative costs. Companies can scale computing resources up or down to fulfill changing needs without service interruption. The cloud can also deliver resilient and secure applications, with an...
underlying infrastructure capable of meeting expected levels of availability, reliability and integrity. The standardized environment facilitates simultaneous service deployment and upgrades for all users, no matter where they are.

Change is possible. The tools exist today

IBM solutions for chemicals and petroleum companies help turn information into actionable insights in order to enhance exploration and production, improve refining and manufacturing efficiency and optimize global operations. When you work with IBM, you’ll be taking advantage of today’s cloud technology to build tomorrow’s solutions and employ these capabilities:

- Visualization of contextual oilfield information
- Strong visualization and manufacturing intelligence features
- Improved decision making using sophisticated measurement and predictive analysis
- Intelligent alerts and event management
- Optimized automation and integration
- Enterprise connectivity with ERP and other systems
- Integration and inclusion

What kinds of options are available?

Using cloud computing technologies for IT service delivery provides chemicals and petroleum companies with the opportunity to gain competitive advantage and maximize return on investment. The best cloud computing solution is one that will take high-cost workloads and move them to low-cost environments that can be dynamically configured and provisioned on demand.

For chemicals and petroleum companies, this means bringing the power of real-time collaboration to mission-critical tasks and gaining access to the scalable high-power computing required in the upstream, downstream and chemicals business. At the same time, these solutions help reduce infrastructure costs and improve investments. IBM solutions for chemicals and petroleum companies are designed to turn information into actionable insights, to enhance exploration and production, improve refining and manufacturing efficiency and optimize global operations. In the following sections, this paper looks at some of the IBM cloud solutions others in the chemical and petroleum industry are employing to move their business forward.

IBM Smart Business Storage Cloud

Raw storage growth is being driven by the explosion of data being created by chemicals and petroleum companies, assets and environments, increased technological demands, the need for instant file access and the need to meet regulatory requirements. Moreover, demands for redundancy and high availability can easily triple the size of an enterprise data storage set. Chemicals and petroleum companies operate in a highly regulated environment, and it is imperative that they store structured operations information and correspondence economically.

For example, they must maintain records of reserves, basis of estimation, engineering data, equipment, site, seismic data (for acreage appraisal and evaluation of the best exploration) and development plans. As a result, they struggle with ever-increasing storage requirements and the need for technological advancements in storage solutions. Supporting access to data in this environment becomes more difficult, with users experiencing outages and reduced performance.

Successfully meeting these challenges can involve significant investments in upgrades to storage infrastructures and the dedication of resources to managing data centers. However, there is an alternative. IBM Smart Business Storage Cloud can help chemicals and petroleum companies successfully deploy a high-performance, scalable storage virtualization solution to facilitate growth and innovation at lower operational costs. By taking advantage of data storage in the cloud, chemicals and petroleum companies can handle growing data volumes and complex file formats more easily.
The Smart Business Storage Cloud helps reduce costs and improve performance with a scalable storage virtualization solution. As data volumes grow and the ability to handle various file formats becomes more complex, supporting efficient, cost-effective and secure access to data can be increasingly difficult and costly. Smart Business Storage Cloud can help chemical and petroleum companies successfully deploy a high-performance, scalable storage-virtualization solution to facilitate growth and innovation at lower operational costs.

**IBM Smart Business Desktop Cloud**

The chemicals and petroleum industry is dynamic; changes in demand and supply of the products expose companies in the industry to fluctuating profits and require a flexible production and distribution strategy. Real-time information from oilfields and drilling platforms must be accessible so that experts can collaborate, analyze and make decisions about production and instruction. The geographic spread of chemicals and petroleum operations—from oil rigs in the deep sea and difficult terrain to large and complex refineries in developing countries—makes transmission of information difficult without a robust IT infrastructure.

At the same time, information relating to the exploration, development and production from the oil wells is highly classified and regulated, so the creation of a secure IT environment for accessing the relevant applications remotely can require a huge investment and enormous resources. At times it might not even be feasible.

For chemicals and petroleum organizations that need to provide simplified, secure access to information and reduce costs, the IBM Smart Business Desktop Cloud helps provide “anytime, anywhere” access to applications, information and resources. As a desktop virtualization solution, the Smart Business Desktop Cloud centralizes a distributed client environment, helps safeguard data and applications and helps increase business flexibility. It can also help reduce the cost of desktop hardware and management while integrating hardware, software and services.

With the Smart Business Desktop Cloud, users can have faster, more secure access to corporate data and applications from nearly any device. This solution supports bring your own device (BYOD) initiatives to transform your traditional desktop infrastructure into a virtualized environment. Working with market-leading partners, we provide a robust set of capabilities, from assessment and planning to design and implementation. Virtualization can benefit almost all areas of your organization—including engineering and design, where high-bandwidth applications have been difficult to migrate—for improved productivity and increased business flexibility.

**IBM infrastructure as a service**

IBM offers a choice of robust, open infrastructure as a service (IaaS) solutions that are based on open standards. Use self-service IaaS or our fully managed IaaS to deploy and scale virtual and dedicated bare-metal infrastructure, develop applications and run your production-ready workloads.

**IBM SmartCloud Enterprise+ delivers fully managed IaaS**

IBM® SmartCloud® Enterprise+ (SCE+), which is a fully managed enterprise-class public cloud infrastructure-as-a-service (IaaS) offering from IBM, delivers a secure and scalable hosted IT infrastructure with on-demand access to virtual server and storage resources. Ideal for development and test activities, as well as other dynamic workloads, SCE+ is optimized for running production workloads such as Oracle and SAP applications in the cloud. With highly flexible services and proven best-in-class security, SCE+ offers SLAs up to 99.9 percent and many advantages of a private cloud—such as choice of dedicated servers and storage—while providing flexible scaling and beneficial cloud economics.
SCE+ is part of the larger IBM SmartCloud framework, which also includes cloud architecture for private and hybrid clouds, as well as software as a service (SaaS) business solutions. SCE+ is secured with multiple levels of isolation, managed by IBM specialists and offers a global reach through a network of world-class IBM SmartCloud data centers on five continents. You can shift focus to developing new services because your developers can focus on code and testing—instead of being distracted by maintaining your infrastructure and development environment. In addition, SCE+ offerings enable companies to gain access to enterprise-grade development and test environments and tools as a service, which can help accelerate development, testing, and batch or web analytics processing.

**Realize self-service IaaS with IBM SoftLayer**

The IBM acquisition of SoftLayer extends and expands the IBM SmartCloud Services portfolio, offering customers worldwide—spanning small and medium businesses (SMB) to enterprise and partners—a robust and comprehensive OpenStack-compliant cloud portfolio.

Using SoftLayer technology, IBM is building a set of next-generation infrastructure platforms that hide the complexity of cloud computing, freeing customers to use the power of cloud to help achieve and surpass business goals. IBM SoftLayer has built a unified platform with innovative high-performance architecture and private, global network. Using a single-pane web portal or an expansive set of APIs, users can securely mix and match shared and dedicated (public and private) cloud services with broad-based configuration and mass customization options.

While other clouds end with virtual servers, the IBM SoftLayer unified platform gives you computing that meets your unique needs and requirements (as well as storage, networking, and beyond), with on-demand access to computing resources, automated deployment, hour-to-hour or month-to-month billing, and a single pane of glass for systems management—one portal, one API. Connected through a high-speed, global network of networks topology, the IBM SoftLayer public, private, and out-of-band management networks are fully integrated, spanning data centers and network points-of-presence in the United States, Asia and Europe.

**SmartCloud Managed Backup**

In the 21st century, complicated global politics, financial risks and labyrinthine regulatory requirements are a fact of life for chemicals and petroleum companies. You need the tools to respond quickly both to opportunities and emergencies, and to meet government regulations.

IBM SmartCloud Managed Backup enables security-rich, managed protection of critical data. By offering private or public cloud-based, on-site or off-site data backup services, we help you create and implement a plan that is designed to address your unique backup, retention and retrieval needs and provide security-rich, around-the-clock access to information. With a choice of scalable, more flexible and managed data protection solutions, you can reduce your total cost of ownership and better manage your compliance requirements.

**IBM cloud security solutions**

IBM security solutions provide layered protection and deep insight across public, private and hybrid cloud environments. They help organizations manage user identities, protect data and applications, and prevent sophisticated attacks with advanced analytics. IBM protects cloud environments with practical cloud security strategies and a comprehensive portfolio of services and solutions that span the entire cloud lifecycle and all security
domains. The solutions use advanced security analysis to identify and analyze threats, reduce downtime and improve productivity. IBM offers a four pronged approach securing your data and systems:

- Protect access to cloud assets by establishing a system for managing the identity of users and access to resources
- Secure IT infrastructure without compromising system performance to protect servers, endpoints and networks against threats
- Deliver secure mobile and web applications, and monitor data access in real time
- Implement security through your cloud, edge to edge with a platform to enable real-time correlation and security event detection across the cloud

With an emphasis on visibility, control and automation, IBM cloud security solutions can help you meet regulatory compliance mandates efficiently and defend against the latest threats. With IBM, you can have a robust, security-rich cloud and a security program that spans the entire cloud lifecycle and all security domains. IBM can help energy and utility organizations better understand threats and vulnerabilities in terms of business impact, and respond to security events with controls that optimize business results.

IBM security solutions are supported by the world-renowned IBM X-Force® team—one of the most respected commercial security research and development teams in the industry. The IBM X-Force helps organizations stay ahead of emerging threats by analyzing and maintaining one of the world’s most comprehensive vulnerability databases. The IBM X-Force researches and evaluates the latest security threats and trends, and develops countermeasure technologies for IBM security solutions.

**High performance computing solutions**

The efficiency, flexibility, high utilization benefits offered by cloud computing have been difficult to achieve in high performance computing (HPC) environments due to the extraordinary performance demands that engineering, scientific, financial and research workloads place upon HPC infrastructures. However, the performance gap between physical and virtual deployments is closing and HPC users can now benefit from the flexibility, cost efficiencies and improved resource sharing that the cloud provides. These are differentiators that may yield substantial value in the context of the chemicals and petroleum industry, in particular in the upstream area, where boosting seismic processing performance, reducing cycle time of reservoir simulation and applying analytics may uncover great value. Cloud solutions for HPC from IBM are designed to deliver high performance cloud resources that provide the computing power you need with the advantages of the cloud model.

By applying cloud technologies and standards to established HPC infrastructures, costly, inflexible silos can be eliminated and shared computing resources can be used to help you:

- Enhance productivity and facilitate collaboration with an easy-to-use, web-based portal and visualization tools.
- Improve data access, resource availability and security while boosting performance.
- Increase throughput of heterogeneous workloads across diverse resources.
- Increase automation and decrease manual effort for improved administrator productivity.
- Reduce operating costs and total cost of ownership with a consolidated high-performance infrastructure.
Cloud solutions for HPC from IBM are designed to transform static computing resources into flexible high performance clouds that can be shared, remotely managed and easily provisioned to support the demands of compute- and data-intensive workloads and changing user requirements. This means your organization can deploy an efficient, consolidated infrastructure that meets time-variant business and research demands—and the performance that your users and workloads demand.

HPC cloud offerings from IBM have intuitive and versatile user interfaces, automated workload-based virtual and physical machine provisioning, robust “resource-aware” job scheduling and migration, and powerful self-service deployment capabilities to help ensure departmental, enterprise or community resources are optimally distributed and easy to manage. The tools are designed so you can align resources with project priorities and realize improved operational and cost efficiencies while achieving business goals unattainable with other management systems.

**IBM WebSphere Cast Iron Cloud Integration**

IBM WebSphere® Cast Iron® Cloud Integration products enable you to integrate cloud and on-premise applications in days, reduce integration costs and optimize resources and productivity in software as a service (SaaS) and cloud models. They provide graphical configuration—rather than custom coding, on-demand tooling or traditional middleware—to help you integrate applications quickly and simply. The products use pre-configured templates based on common integration scenarios to accelerate integration. Such capabilities are relevant in the chemical and petroleum industry, where vertical solutions must be un-bound.

WebSphere Cast Iron Cloud Integration products provide several capabilities for near-real-time integration, including data cleansing and migration, data synchronization and connectivity, workflow improvement and transformation that enable you to orchestrate integration processes across multiple applications.

Mashup capabilities help you integrate information from disparate sources and display it using the native user interface of a cloud application. WebSphere Cast Iron Cloud Integration products also support mobile applications by harnessing data and processes from other parts of the enterprise.

WebSphere Cast Iron solutions are available in multiple form-factors, including software-as-a-service, platform-as-a-service (PaaS), as a virtual appliance and as a hardware-based appliance. As a result, integrations can be provisioned in the public cloud, behind the firewall, or in private cloud virtual environments.

**IBM software as a service**

The portfolio of IBM SaaS offerings is continually expanding to help organizations focus on business and not IT deployment. Accelerate your innovation with over 100 SaaS applications and business process-as-a-service (BPaaS) capabilities, all delivered with the enterprise-grade security, availability and elasticity you expect from IBM.

**IBM SmartCloud for Smarter Analytics**

Cloud makes possible not just new kinds of applications, services and products—but also new types of data. Running analytics on this data—combined with other data across the enterprise—creates new kinds of insight. Running analytics as a SaaS allows your organization to leverage the latest capabilities, without investing the time or money to build them on your own. And with self-service analytics applications in the cloud, employees can deepen their insight into customers, competitors and the supply chain—continuously.

IBM SmartCloud for Smarter Analytics helps companies quickly turn information into insights. By analyzing massive volumes and varieties of constantly changing data, organizations can uncover threats and opportunities, build efficiencies, and make better-informed decisions.
IBM SmartCloud for Smarter Analytics helps companies accelerate their ability to turn information into insights. For instance, by integrating seismic and geologic data from multiple sources and using advanced data modeling available with SmartCloud for Smarter Analytics combined with supercomputing, companies can increase the success rates of locating remote resources and unburden their engineers to focus on more productive work. IBM SmartCloud for Smarter Analytics can help render larger amounts of complex data in more intuitive ways, allowing engineers to improve their decision making and, ultimately, their production effectiveness.

IBM SmartCloud for Social Business
The ways individuals and communities interact, form relationships, make decisions, accomplish work, and purchase goods are changing the way business is done. A social business embraces and cultivates a spirit of collaboration and community—internally and externally—delivering unprecedented return for the time invested.

A social business recognizes that people do business with people and optimizes how people interact to accomplish organizational goals by:

- Deeply connecting individuals in productive, efficient ways.
- Providing line of sight across traditional boundaries and better aligning actions to needs.
- Speeding business with insight to anticipate and address evolving opportunities.

IBM has integrated the essential tools for social business in the cloud: enterprise-grade file sharing, communities, instant messaging, web meetings, user profiles, mail and scheduling features. IBM SmartCloud for Social Business is designed to let you work seamlessly with people inside and outside of your organization. It analyzes billions of social media comments and provides customized results in configurable charts and dashboards.

Meet online, share files, chat, manage projects, network with potential clients, schedule meetings, and send and receive mail anywhere, anytime. Whether you work remotely, manage remote teams, or need one place to bring colleagues, partners, customers and vendors together, our offerings help you transform your business into a social business.

IBM cloud consulting services
Every cloud strategy combines a technology discussion, and a business model discussion. Where does it make the most sense to run a given workload—from a business perspective and a technology perspective? What works best for your own unique circumstances and goals? The answer changes as circumstances change: As market conditions evolve. As a new product takes off. As regulation in your industry, security concerns and compliance requirements change. IBM can help you develop a custom action plan—based on comprehensive workload, readiness and return on investment analyses—that is specific to the chemicals and petroleum industry and your specific requirements.

IBM cloud consulting services serve as a stepping stone to our portfolio of cloud computing services and products. IBM cloud consulting services can help chemicals and petroleum companies develop a business-based cloud strategy that integrates cloud computing into their business. Some of the questions our cloud consulting services can help you answer include:

- Where in my enterprise does it make sense to use cloud computing?
- What kinds of tasks and processes are suited to run in the cloud?
- How much will it cost, and when is the right time to implement cloud computing?
Powered by best practices and methodologies we have developed through hundreds of cloud computing engagements with clients, and the wide range of cloud computing solutions and tools we offer, including IBM Research innovations, our consulting services can help you begin or accelerate your adoption of cloud computing, while minimizing your risk and investment. Our expert advisory services span all aspects of your business—from strategy to applications to infrastructure—covering network, data center and security to help you overcome any challenges you may face when employing cloud computing.

Some of our cloud consulting services focus on the business impact of cloud—including when and where you should adopt cloud to enter new markets and deliver new service, and how best to integrate cloud computing into your overall business and technology strategy. We can also evaluate your test environment, estimate return on investment and help you build a business case for moving testing to a virtualized environment. We also offer services focused on development and implementation of cloud-delivered applications.

If you have decided to transform your IT and computing delivery to provide services from the cloud (or to use cloud computing to augment your IT delivery), our cloud consulting services can help you assess your readiness and create a cloud implementation road map to maximize your return on investment. IBM has easy-to-use tools that analyze your existing infrastructure, workloads and costs in detail. The information we glean helps us develop a road map that provides a prioritized list of cloud migration activities to help you achieve rapid and high return while minimizing risk to your operations and to your organization.

Even if you are already using cloud computing, IBM provides IT transformation, optimization and resiliency consulting to ensure that you are maximizing utilization of your computing environment and providing the best possible user experience.

IBM Strategy and transformation services for cloud computing

New technologies—from resource extraction to new business tools—and changing marketplace dynamics can fundamentally alter how you view your target markets and product and service portfolio. Whether these changes are company-wide or address a niche in your market, IBM Strategy and Transformation services, part of IBM Global Services, integrate management consulting capabilities that can help chemical and petroleum companies gain the benefits of converting to a cloud environment. Strategy and transformation consultants use proven methodology and assessment tools for developing a business-based cloud adoption strategy that is tailored to your unique needs and requirements. IBM Strategy and Transformation services can help you plan a cloud computing environment to help you:

- Foster innovation to increase competitiveness and differentiation, spark customer centricity and drive growth.
- Improve forecasting and reporting, develop predictive capabilities, reduce enterprise risk, and optimize your regulatory compliance.
- Harness technology to drive business innovation and create sustainable growth while optimizing IT.
- Improve your operating model and interconnect end-to-end supply chain functions for optimized process efficiency and effectiveness.

Strategy and transformation services for cloud draws on the expertise of IBM’s management consultants to achieve end-to-end transformation, from strategy to implementation, and increase the efficiency of cross-functional collaboration. IBM professionals have the skills, experience and understanding across many industries to be able to identify the right cloud opportunities for your organization and to develop a cloud implementation strategy and roadmap for your company.
Why IBM?
The risky, dangerous and expensive process of resource exploration and production, coupled with the declining profit margins of refining and bringing products to market leaves little room for error in the solutions you employ. The extensive industry knowledge, implementation experience and advanced research and development capabilities we offer have been helping our clients in the chemicals and petroleum industry innovate for decades.

When it comes to IT management, IBM is a recognized leader. Gartner Inc. has named IBM a Leader in the Gartner Magic Quadrant for Data Center Outsourcing and Infrastructure Utility Services, Europe (also North America and Asia/Pacific). IBM manages 430 data centers worldwide at IBM and customer locations in all major geographic regions. Your cloud solutions can be deployed and managed at a location that meets your requirements and yields the greatest economic benefit for your business, whether at an IBM facility or in your own data center. IBM worldwide centers for cloud and managed computing resources include thousands of skilled consultants and architects, cloud centers of competency, executive briefing centers, centers for proofs of concept and benchmarking.

IBM currently has 11 cloud laboratories to innovate and build new features, and seven cloud data centers to implement and manage solutions. These cloud data centers currently support clients in 53 countries. IBM addresses the needs of our cloud computing clients by leveraging the breadth of our cloud computing services and technology expertise and our network of fully equipped research and development facilities—the largest in the IT industry. The IBM experts help you strategize how to use cloud to drive not just savings, but revenue and growth.

For more information
To learn more about cloud solutions for the chemical and petroleum industry, please contact your IBM representative or IBM Business Partner, or visit the following website: ibm.com/chemicalspetroleum

Additionally, IBM Global Financing can help you acquire the IT solutions that your business needs in the most cost-effective and strategic way possible. We’ll partner with credit-qualified clients to customize an IT financing solution to suit your business goals, enable effective cash management, and improve your total cost of ownership. IBM Global Financing is your smartest choice to fund critical IT investments and propel your business forward. For more information, visit: ibm.com/financing

About the authors
Øystein Haaland has a global BDE role – focusing on identifying technology solutions that can support and improve existing business processes (E&P, O&M, HSSE, IO and more) as well as creating ground for new processes herein. Recently, he has coordinated and managed several R&D Joint Industry Projects (JIP) in the area of Integrated Operations together with both operators and service companies. He holds an electronics engineer master from UiS – Stavanger and he also has an MBA from Henley Management College, UK.