

Beyond buzzwords: Future focus for the oil and gas industry

Background: digital transformation in the oil and gas industry

Even though the term “digital transformation” seems to be everywhere, there is a lack of agreement about what it means. According to Gartner, “The overwhelming majority of oil and gas companies, 89%, now have digital initiatives at some stage of development.”¹ It is common for organizations to define digital transformation as whatever high-profile technology initiative they are currently working on, such as cloud, Internet of Things (IoT), or machine learning.

Any or all of those can play a part, but the circular logic of defining transformation as whatever you are already doing misses the point. It also makes it harder to find the value potential for your organization. Red Hat is working with the oil and gas industry on workshops and other enablement efforts to help companies define their visions for digital transformation, embodied in specific digital tenets.

Those best practices provide guardrails to help ensure that the hundreds of millions of dollars being invested are spent wisely. Ultimately, transformation efforts must contribute to core goals of the business, such as finding oil faster and then recovering it and bringing it to market more effectively, while reducing the cost and operational risk of doing so.

The potential value of creating new agile business models based on digital technologies is clear. Accenture reports that a 30–35% improvement in earnings before interest, tax, depreciation, and amortization (EBITDA) is possible for oil and gas companies, in addition to capital expenditure (CapEx) reductions in both upstream and downstream operations.² To help the oil and gas industry get the full value of digital transformation, Red Hat offers the approach described in this paper.

Making transformation tangible

First and foremost, digital transformation is the process of using software to increase competitive value. As a simple example, consider the value of automating common IT tasks across infrastructure, applications, networks, containers, security, and cloud. Doing so frees staff to focus on higher-value work, such as enabling new services and capabilities for the business.

“Digital transformation is an organization’s ability to wield software and data with agility and velocity, so the business can compete, differentiate, disrupt, and if fortunate, innovate,” said Stephen McAleer, Kubernetes and Cloud Platform Sales Specialist in Red Hat’s Energy Vertical.

Wielding software and data in this way requires the organization to be able to bring new software and capabilities into production rapidly and smoothly, with minimal risk. Honing that ability enables the IT organization to make any software and data resource available that will help the business be more competitive and successful.



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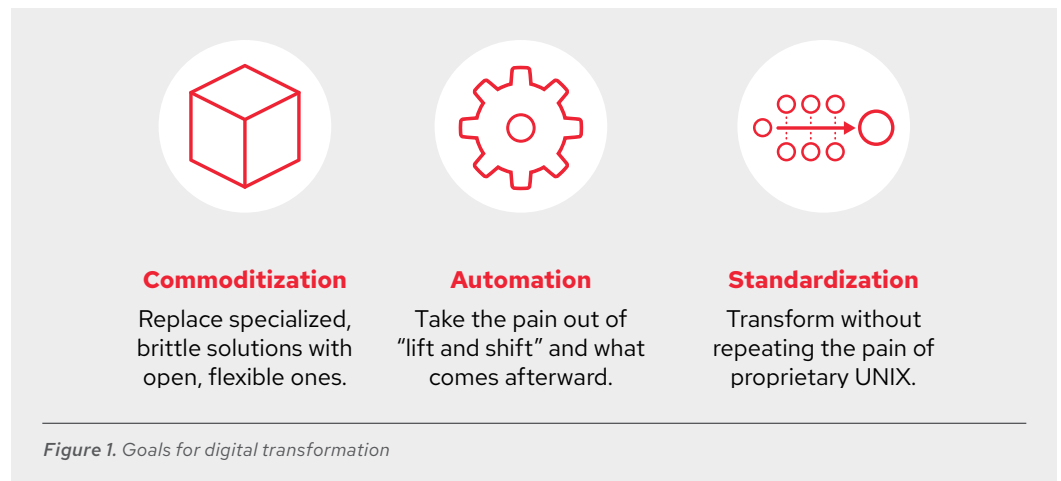
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¹ McAvey, Rich, and Simon Cushing. “2019 CIO Agenda: Oil and Gas Industry Insights.” Gartner Research Note G00367960, 15 Oct. 2018.

² Accenture. “Digital agility: From high hopes to higher value.” 22 Aug. 2018. www.accenture.com/us-en/insights/strategy/oil-gas-digital-agility

Setting distinct goals

Ultimately, the precise definition of digital transformation might be less important than having agreement about the definition among different parts of the business. Without such agreement, work on digital initiatives can become inefficient or unsuccessful, with various business entities working at cross purposes instead of toward a common goal. Accordingly, Red Hat recommends an integrated approach to digital transformation based on three distinct goals: commoditization, automation, and standardization.



All three of these goals enable a more open, flexible environment. Commoditization is the effort to leave behind the high cost, inflexibility, and vendor lock-in that can result from using public clouds and proprietary virtualization, adopting open infrastructure in their place. In addition, companies are challenged to automate migration from proprietary environments to open ones, as well as to automating day-to-day operations afterward. Finally, companies should adopt transformative capabilities such as cloud and containers in as open a manner as possible, maximizing standardization and portability.

Each goal is examined in more depth below.

Commoditization: replace specialized, brittle solutions with open, flexible ones

Moving from proprietary, closed systems to open source is a hallmark of the digital strategy championed by Red Hat for many years. The ability to access and change the source code as needed gives customers control that they would otherwise cede to vendors, including flexibility to accommodate future business needs.

The drive to modernize, and especially to adopt public cloud solutions, is seen as an opportunity to continue that progression away from closed legacy architectures. While that is true, there is a danger in allowing digital transformation to be defined as the adoption of one or more public cloud services.

Moving headlong into public cloud without an open-systems strategy can deprive businesses of the core value propositions of modernization and digital transformation. These value propositions should include accelerating application development, increasing scalability and dependability, and simplifying adoption of modern development practices such as agile and DevOps.

Escape legacy datacenter inflexibility

It is common for Red Hat's oil and gas customers to have hundreds of applications in production, most of which are based on closed source code that they cannot access. That includes a massive proportion of .NET applications, as well as a significant Java™-on-Windows footprint. In many cases, migration initiatives are driven by the need to move away from Windows Server 2008 as it reaches end of support in 2020.

Moreover, many of these off-the-shelf applications have been in use for a decade or more and are highly customized. This can create a high barrier to change because new software would have to be likewise customized just to provide parity of functionality.

As a result, many of these applications are multiple revisions out of date—a situation that has no simple solution. That can have significant impact on the business's ability to adapt to new requirements, and it can also introduce security exposures from outdated code.

A fundamental digital tenet offered by Red Hat is to “stay vanilla,” meaning to avoid customizing any code that includes intellectual property you do not own. This edict should be directed by senior management from the top down, requiring a solid business case that justifies the additional technical depth associated with customizing any off-the-shelf software. This approach lets a company move more quickly with future changes to the software environment.

Looking to digital transformation, most customers will benefit from considering containers running on hybrid cloud as their preferred target environment. Containerization enables all of an application's dependencies to be packaged in a lightweight bundle that can execute anywhere.

Red Hat® OpenShift® is the preferred option for implementing containers, delivering flexibility that combines Open Container Initiative (OCI)-compliant container images with enterprise Kubernetes container cluster management. The security of the platform is a differentiator. Red Hat OpenShift runs an integrated security stack from the Red Hat Enterprise Linux® kernel out to the workload and the edge. It also offers strong isolation and role-based access controls with integrations to enterprise authentication systems.

Using OpenShift to escape legacy datacenter inflexibility breaks down barriers to change, so the business can keep technology current more easily.

Avoid public cloud lock-in

One common interpretation of digital transformation is the belief that moving applications from owned, on-premise infrastructure to the public cloud will increase agility and reduce costs. In reality, it can be far simpler and less expensive to get data into a public cloud environment than to get it back out.

Cloud providers can make this “data gravity,” the difficulty of data to escape, more problematic with strategic pricing that makes data ingress cheaper than data egress. Like with other types of gravity, the effect is stronger where there is greater mass, such as the very large datasets that exist with seismic exploration and reservoir development.

For example, it is common for oil and gas companies to have core database functions served by enterprise resource planning (ERP) line-of-business applications that were built using PowerBuilder 15 years ago or more. As they consider their options to modernize those applications, some see a path forward in rewriting the code natively to a public cloud platform.

Unfortunately, this approach only moves the functionality to a new, updated platform, without updating the fundamental design principle to a more open one. In other words, it ignores the digital design tenet of enabling flexible deployment options to resolve the brittleness of code that is confined to a single environment. Writing native code that is tightly coupled to a public cloud or any other stack is poor design practice that can create technical debt by obligating the business to migrate again to another native platform as the underlying technologies change.

Instead, modernized applications should be packaged in containers and target operation on Red Hat hybrid cloud, making them deployment-agnostic. Using this approach, applications can move nimbly across environments, including public and private clouds, bare-metal servers, and virtualized infrastructure. Interoperation between on-premise and public cloud resources enables any-cloud flexibility, scalability, and performance while containing costs.

Automation: take the pain out of “lift and shift” and what comes afterward

For many IT organizations, it is impractical to modernize large collections of applications because of their sheer number and the fact that many are closed source. Accordingly, running an application based on a legacy, unsupported operating system (OS) inside some combination of virtual machines (VMs) and containers improves overall solution security but retains the core exposure of the OS.

At the same time, because virtualization has become commoditized, the high costs carried by legacy proprietary platforms such as VMware vSphere are no longer warranted. Likewise, migrating Java workloads off of proprietary Java servers to Red Hat JBoss® Enterprise Application Platform can help save dramatically on costs.

In the context of these realities, “lift and shift” is an inescapable requirement for many mainstream oil and gas companies. Automating the process and management of the environment after migration carries significant opportunities to reduce one-time and ongoing expenses.

Reduce the burden and risk of migration

Many organizations that have gone through lift and shift would agree that it is painful, arduous, and slow. Individually migrating hundreds or thousands of applications is resource-intensive, error-prone, and time-consuming. Automating the process is a critical factor in its overall success, minimizing the burden and risk of running legacy datacenters while setting the stage to ditch proprietary virtualization.

Establishing Ansible® Playbooks can facilitate automation of the process of migrating applications to a modern environment such as OpenShift. Red Hat oil and gas clients have adopted Ansible to optimize their “lift and optimize” approaches, reducing the manual effort required and accelerating the process.

This automation approach does not make applications cloud-ready or rebuild them as cloud-native, meaning that it does not result in truly “modernized” applications. However, it does mitigate issues regarding end-of-life for legacy OSs and facilitates a step away from running legacy datacenters, eliminating costly infrastructure.

The Red Hat infrastructure migration solution further automates migration from legacy data-center technologies such as proprietary virtualization to updated environments such as Red Hat Virtualization and Red Hat OpenShift, as well as future infrastructures. This technology is progressing rapidly toward greater scale and the ability to migrate hundreds or even thousands of workloads simultaneously.

Automation based on Red Hat's infrastructure migration solution accelerates the move away from proprietary virtualization and its accompanying high cost and inflexibility. Eliminating those infrastructures reduces future burdens associated with closed approaches that will make it difficult to shift infrastructures in the future. Using the combination of Ansible Playbooks and Red Hat's infrastructure migration solution, customers can typically migrate completely off of proprietary virtualization platforms within a year.

Streamline resource administration and management

Too many IT departments are occupied with maintenance and support of basic systems, infrastructure, and applications rather than with transformative projects that build profitability, competitiveness, and agility for the business. Their challenge is to streamline the manual, resource-intensive, and error-prone administration of multiple services and environments.

The key to meeting that challenge is to automate IT administration and management using Ansible Playbooks, managing VMs and containers with a single control plane based on OpenShift. Management automation pays significant dividends across this entire stack of diverse workloads. In particular, this automation is enabled through the use of Ansible operators, which allow administrators to package operational knowledge such as how to install and maintain an application in the form of Ansible Playbooks. Ansible operators enable a simple routine such as a basic install to be flexibly expanded upon over time to customize behaviors in response to changing needs.

This modernization tenet of automation removes the need for a human operator to be occupied by menial, error-prone administration tasks. Administrators can run an automated environment based on Red Hat Virtualization without ever actually logging in to it.

Container-native virtualization is an add-on to Red Hat OpenShift that allows VMs to be run and managed alongside containers using a single control plane. Thus, it is no longer necessary for administrators to have expert knowledge of multiple management platforms.

Streamlining resource administration and management of the OpenShift environment through ruthless automation based on Ansible drives down the cost and risk associated with IT. It can also liberate resources so that they can contribute to ongoing innovation, including agile integration, process and resource optimization, and the adoption of emerging technology approaches such as IoT.

Standardization: transform without repeating the pain of proprietary unix

Many oil and gas companies are implementing containers as a means toward a single software platform that spans all their environments, including on-premise datacenters, cloud, and the edge. This standardization eliminates the need for multiple proprietary solutions and the headaches that result from trying to get a holistic view when managing them.

Red Hat is uniquely suited to deliver on that vision, with an open source solution that gives customers greater control than proprietary code offers. The Red Hat stack also extends to include Platform-as-a-Service (PaaS) by means of the Red Hat Middleware portfolio. Customers can extend the openness of their solutions even further by embracing open application programming interfaces (APIs) and a structured approach to adopting Kubernetes and containers.

Simplify connectivity with open APIs

A common goal of companies as they seek to modernize is to build cloud-native internal applications. While the goal is worthy, it must be pursued with an eye toward ensuring interoperation. Specifically, applications that are hard-coded for a specific PaaS are not portable to others, creating friction against interconnecting diverse application systems and platforms.

The preferred approach is to adopt an ecosystem of open APIs that abstract away the complexity of connecting to a specific platform. Applications consume native cloud services by means of those APIs. This approach simplifies the adoption of a new PaaS or service in the future, allowing migration without friction.

Red Hat 3scale API Management provides an open, security-focused, flexible environment for an organization's universe of APIs as it grows, automating any-to-any data connectivity for current and future applications, services, and data sources. Deployable on-premise, in the cloud, or any combination of the two, 3scale API Management mitigates the management complexity associated with proliferating collections of APIs.

Centralized control of APIs based on 3scale API Management includes access and traffic control, analytics, and monetization. A robust, cloud-native development and operational environment is provided by integration with Red Hat OpenShift for building and running high-performance applications, as well as with Red Hat Fuse for creating APIs, even by nontechnical business users.

The 3scale API Management environment provides robust security through a combination of policy enforcement and support for a wide range of encryption, authentication, and authorization protocols.

Standardize Kubernetes from the beginning

As part of the current industry transition, many independent software vendors (ISVs) have started to use containers to package applications for delivery to their customers. In many cases, they are also bundling those containers with Kubernetes. As a result, many customers have begun to accumulate multiple versions of Kubernetes, including bespoke versions created by ISVs and multiple revisions that reflect the release of a new Kubernetes version each quarter.

This situation has created the possibility for a new iteration of the complexity that enterprises lived through a decade or two ago when they accumulated multiple proprietary flavors of UNIX. Over time, most enterprises standardized on a single flavor, followed by a commoditization that led to the adoption of Windows and Linux. Those transitions were arduous and expensive.

Today, the early status of container adoption means that customers have the opportunity to avoid the trap of adopting multiple flavors of Kubernetes. The situation is unique in that there is not a large install base of diverse versions of Kubernetes, and that Kubernetes is open source.

The recommended approach for customers is to avoid buying software that is bundled with Kubernetes. They should insist that even if ISVs package their software in containers, they should deliver them as stand-alone binaries. This strategy applies equally to the entire software ecosystem, including custom software from a solutions integrator, for example.

By avoiding bespoke versions of Kubernetes, customers prepare themselves for a smoother future. The approach involving stand-alone containers provides an immutable way to distribute software through a continuous integration and deployment pipeline, getting it into production as fast as possible.

Conclusion

“Digital transformation” is a buzzword, but it is not an empty one. Defining it in a meaningful way that contributes to intelligent strategy can help provide a once-in-a-generation opportunity for oil and gas companies. It is useful to recognize that the entire supply chain is undergoing a digital transformation at the same time, so engaging in this effort is critical to self-determination. Embracing open architecture is also central to avoiding unneeded complexity and barriers in the future.

Following good design patterns and digital tenets is central to smooth, cost-effective operation in the near term, as well as avoiding a new generation of technical debt. Oil and gas companies that do this can improve software velocity and agility for a sustainable future in which commoditized technologies are favored over proprietary ones, migration and day-to-day management are automated, and standardized connectivity and interoperation are foundational expectations.

Meeting these challenges effectively positions companies for successful market engagement in the future, but taking shortcuts today will lead to rework and added expense tomorrow.

About Red Hat



Red Hat is the world’s leading provider of enterprise open source software solutions, using a community-powered approach to deliver reliable and high-performing Linux, hybrid cloud, container, and Kubernetes technologies. Red Hat helps customers integrate new and existing IT applications, develop cloud-native applications, standardize on our industry-leading operating system, and automate, secure, and manage complex environments. Award-winning support, training, and consulting services make Red Hat a trusted adviser to the Fortune 500. As a strategic partner to cloud providers, system integrators, application vendors, customers, and open source communities, Red Hat can help organizations prepare for the digital future.



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